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See Feature Articles in this Issue

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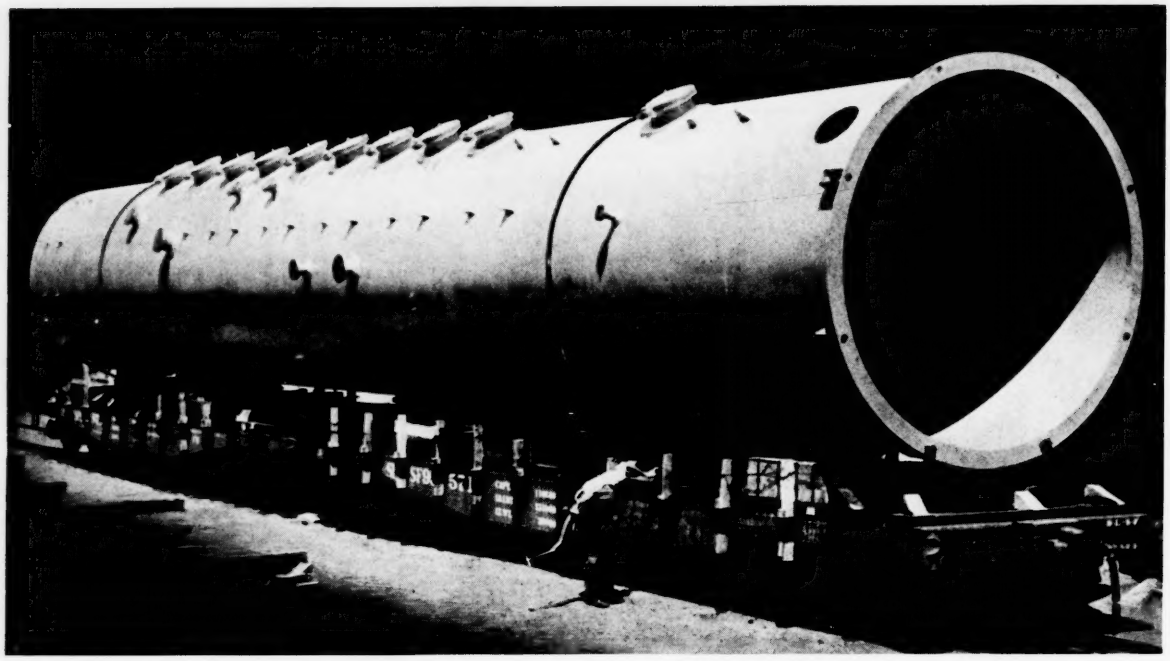

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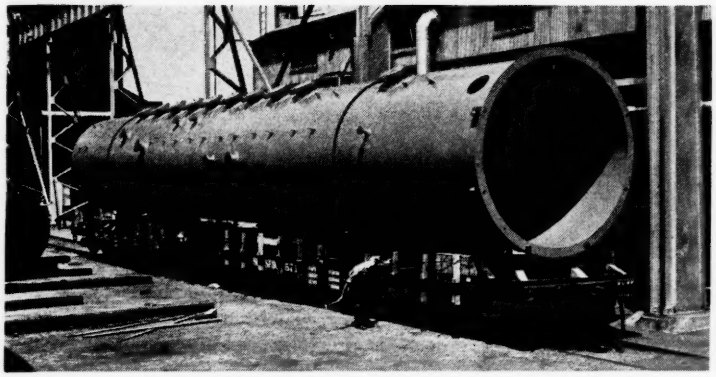

A bubble tower, 84 ft. long and 11 ft. diameter fabricated by the Chicago Bridge & Iron Co., at their Birmingham, Ala., plant for the Rock Island Refining Company at Beckett, Okla.

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MANUFACTURERS RECORD

Devoted to the Upbuilding of the Nation Through the Development of the South and Southwest as the Nation's Greatest Material Asset

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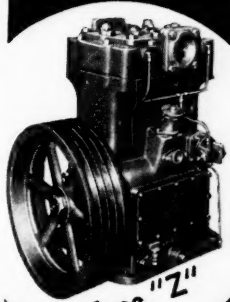

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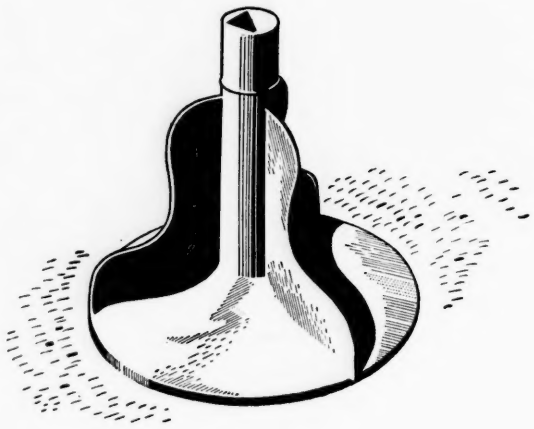

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ETERNAL VIGILANCE NECESSARY

Americans of all classes will do well to ponder the momentous occurrences in other parts of the world. Great changes are taking place in the lives and circumstances of a large part of the earth's population. Vital history is being made in a breath-taking way. What it means for the future possibly no one is wise enough to say, but it will not do to say it will have no effect upon us in America because the effect is likely to be marked and far-reaching.

As one searches for the reasons for the great upheavals that this generation and the preceding one have witnessed, however obscure these reasons may be, it must be recognized that tremendous forces are at work changing the political and social conditions of people everywhere.

The World War is credited with being the cause of the unrest existing at present, but the war was a gigantic manifestation of what had been brewing, and the peace that followed did not settle the problem. It is not a revolution for greater liberty nor to divide wealth. If it is, surely the evidences of its failure are abundant. Cummunism in Russia hasn't done that and its purpose remains obscure. In Fascist countries the state and its supremacy is the objective. The citizen is merely a cog in the machine.

Our own situation in America has given us a very definite inkling of some of the forms this unrest may take. The sit-down strike was an indication. A land where living conditions are better than anywhere else on earth is assailed by malcontents, not alone by aliens, but by a considerable number of Americans. Note the activities of the Workers Alliance.

One sees only as through a glass darkly when the world situation is viewed, but we should recognize the value of our heritage and hold it sacred.

"Eternal vigilance is the price of liberty."

As we see it—

The Cotton Muddle

THE CONFUSION of the cotton situation, as pointed out in these columns on numerous occasions, is indeed great and it is doubtful if the proposed cures will solve the problem. The U. S. government has on hand approximately 11,000,000 bales which presumably it wants to market in an orderly way. The re-establishment of our foreign trade is said to be a primary and certainly a desirable objective.

At the start of the 1938 season there was a world carryover approaching 23,000,000 bales made up of over 13,500,000 bales of American cotton and nearly 9,000,000 bales of foreign cotton, so that together with present growth of over 12,000,000 bales of U. S. cotton and approximately 17,000,000 bales of foreign cotton the total estimated world supply amounts to nearly 51,000,000 bales, or an increase of over 8,000,000 bales beyond the available average supply of 1930-36. To emphasize this situation it should be noted that this amount is nearly twice as much cotton as the world normally consumes in a year. Also, this colossal amount is more than half a million bales larger than it was the previous year in spite of the fact that United States production declined from 18,946,000 bales in 1937 to an estimated 12,008,000 bales in 1938, and in the latter year the acreage was the lowest in 38 years. In other words, though the U. S. cotton acreage was smaller last year than at any period in this century and production was nearly 7,000,000 bales less in 1938 than in 1937, the total world supply increased over half a million bales.

Opinions vary as to the reasons for this mounting figure of world cotton supply, but a partial explanation is found in the fact that consumption of American cotton during 1934-38 averaged 5,800,000 in comparison with an average of 8,300,000 during 1924-29.

A still greater factor was the phenomenal increase of foreign cotton growth which in 1909-10 was slightly over 7,000,000 bales and during the past two seasons exceeded 18,000,000 bales. This at a time when new synthetic fibers in place of cotton were being promoted and world production of rayon staple fiber in particular, which can be spun on cotton machinery, increased from 8,000,000 pounds in 1931 to 623,000,000 pounds in 1937. Furthermore, the larger part of this rayon staple fiber was produced by three countries engaged in a program of self-sufficiency, all of which were previously large importers of U. S. cotton. Two of these countries, Germany and Japan, each produced more rayon staple fiber than did this country and it is estimated that imports of cotton into Japan will as a consequence be reduced by approximately a quarter million bales.

One probable reason for the present Smith cotton proposal which would release some of the government's 11,000,000 bales is the reported complaint from England that a virtual shortage exists of free American cotton, but on the other hand there is still over 25,000,000 bales of free and uncontrolled foreign cotton to compete and that it does compete very effectively is evident not only from the figures quoted above of the decline in consumption of American cotton, but also from the fact that of the more than 18,000,000 bales of foreign cotton produced, consumption last season amounted to 16,635,000 bales. This means the consumption of foreign cotton was 82 per cent of production as compared with only 65 per cent in the case of American cotton in the same season.

To summarize, the root of the trouble as far as America is concerned is the decline of consumption in this country and the rest of the world; increase of competing fibers; increase of foreign growth, and finally, the failure to produce cotton in this country as cheaply as it can be produced abroad. To these should be added that American growers have consistently refused, with few exceptions, to cultivate the varieties, with longer staple and better grade, which might have alleviated the situation. As it is, the untenderability of American upland cotton on hand August 1937, was higher than for any similar date during the previous decade and was actually 21.1 per cent of the 4,382,000 bales on hand.

The South—The Nation's Opportunity

THE MANUFACTURERS RECORD, in referring some months ago to a report of the National Emergency Council and a subsequent report of a Committee of Southern men, had the following to say: "The Committee of Southerners appointed by the President to prove that the South is the nation's No. 1 economic problem did its work quickly; so quickly in fact, that it gives rise to the suspicion the work was done before the public knew it had started; or that perhaps it was done in advance by others."

Following the submission of the Southern Committee's findings, the President stated that the South presented the No. 1 economic problem of the na-

tion. At Charleston recently he repeated the charge.

In several editorials last fall the MANUFACTURERS RECORD presented incontrovertible facts completely refuting the claim and showing not only that the reports were made up of generalities which were impossible of proof, but when figures were quoted they were selected apparently with a view to rationalize a viewpoint already decided upon.

Instead of the South being a woe-begone section where life drags out a miserable span, the facts prove that it presents an outstanding opportunity for new wealth creation with remarkable progress to its credit over a period of years, and with a better record of advancement during the years of depression than other sections have made. The facts prove that its natural resources, its climate, and its American population, create here the greatest undeveloped asset of the nation. Whatever may be its problems it is solving them and they are its own and not the nation's. Its progress from worse than poverty to its present status indicates its ability to solve its problems.

The Blue Book of Southern Progress, an annual publication of this office for many years, is now in course of preparation. Those who read it will see in its contents the basis for a great industrial empire. What has been done in recent years is but an indication of what is to transpire. It will be a volume of facts and not theories.

Capital is awaiting confidence and opportunity. In the Southern states it will find conditions favorable to its increase such as exist nowhere else. The 1939 edition of the Blue Book of Southern Progress will provide source material indispensable to every business organization, to public officials, libraries, schools and readers generally who may be interested in the story of industrial creation and the development of what is unquestionably the nation's greatest material asset. The volume will contain the facts of progress and the basis on which future progress rests.

The Sales Tax

A SALES TAX paid by the final consumer at the point of purchase would do away with the complicated, confusing mass of taxes which are such a serious handicap to corporations and individuals. Very few reasons are offered against it and none of them conclusive.

The man in every-day life pays most of the taxes. This is the worker in shop and factory and office and on the farm. He is now subjected to hidden taxes which in most cases, although he does not realize it, are being levied on the things he buys.

The politician won't vote for a sales tax because he fears offending his constituents. Instead, he prefers to figure out complicated measures which not only cost the taxpayer as much, if not more, money, but subject him to laborious time-wasting efforts in filling out tax forms. The easiest direct tax ever collected is the tax on gasoline. It was so easy to get that the government tagged an extra cent on state taxes with the promise made on the floor of the Senate that it would be repealed when prohibition went out, but the revenue it created evidently is still thought necessary because the promise has been forgotten.

The states which have used the sales tax even in a limited way have found little objection to its operation, but a vast increase in their receipts.

Under the sales tax the rich man will pay more because he buys more and buys articles of a more expensive kind. It is equable and fair to everyone. It broadens the tax base so that every citizen enjoying the protection afforded by government pays his just share and in doing so, being conscious of the fact, naturally develops a more intelligent interest in the uses being made of his money and hence finds a closer scrutiny of the affairs of government worthwhile.

There can be little doubt of the confusion that is growing at an accelerated pace in tax matters. Time wasted in trying to conform to all the tax laws of communities and states and Federal government is an expensive work. All of these things lead to unemployment. Business slows down. The money it is paying out, the time it is wasting means less money for plant improvement and less money for hiring new help.

The list of taxes on articles of every kind entering into commerce runs into many hundreds of items. The bill to be paid because of profligate spending is bad enough, but whether it stops where it is or goes further, the confusion becomes worse confounded as the tax situation, not alone in the necessity of raising amounts undreamed of before, but in the confusion attendant upon their collection, shows little signs of being cleared up. A determined effort to have legislators adopt a sales tax to save burdensome work and at the same time produce needed income is the simplest way out of the confusion that is halting progress.

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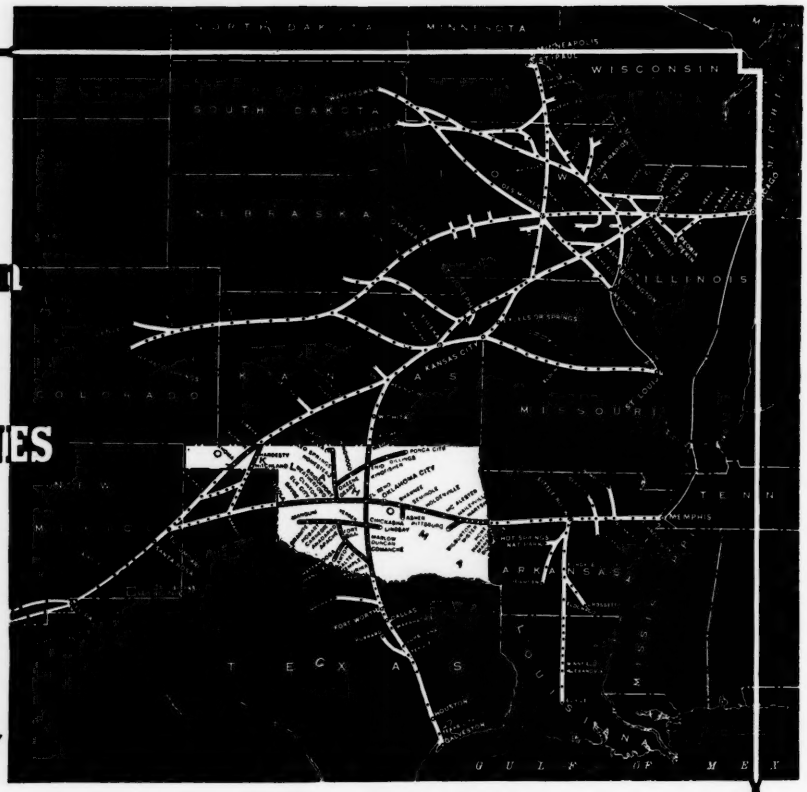

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For further information, call ROCK ISLAND REPRESENTATIVES located in All Principal Cities, or write to

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Industrial Opportunity in Oklahoma

OKLAHOMA was, with the exception of a small area ceded to the United States by Texas in 1850, originally a part of the area included in the Louisiana Purchase of 1803. At an early date much of the land was set aside as the Indian Territory in which large tracts were granted to the Five Civilized Nations of Cherokees, Creeks, Seminoles, Choctaws and Chickasaws. The remaining portion formed Oklahoma Territory and was so designated in 1890. Following the Civil War a considerable part of the Indian land was transferred to the U. S. Government at an average price of less than twenty cents an acre. Of this area certain tracts were then ceded to other Indians with the original stipulation that white settlers should be forbidden. This latter met with stubborn resistance by a group of white people from surrounding regions and more than once U. S. troops were required to eject the intruders before in 1889, after four years of negotiations with the Indian tribes, the first vacant lands of over five million acres were thrown open for white settlers. In subsequent years some seven million acres more were opened. The drive for statehood commenced as early as 1892 but it was not until 1904 that the first bill appeared in the House of Representatives. The following year another bill made its appearance but it too failed to become law, largely because the attempts were aimed at separate statehood for the two territories. Finally, in 1906 a bill was introduced providing for joint statehood which met with approval and Oklahoma became a State of the Union on November 16, 1907. The various Indian tribes still retain nearly twenty million acres.

With an estimated population of 2,548,000 in 1937, Oklahoma ranks 21st among the States. It is 17th in size with 70,057 square miles of which 69,414 is land area, only 643 square miles being water area.

Climate

ALTHOUGH the eastern part of Oklahoma is essentially agreeable for living and exceptional so far as agriculture is concerned, the western section of the state has marked differences of climate, particularly with regard to precipitation which is quite adequate in the southeast but declines to an annual average of only about 18 inches in the north and west. The annual average rainfall for the entire state is about 37.76 inches with 75 to 80 per cent falling during the 210 day growing season between March 1 and October 31. Snow which averages only a few inches annually seldom lasts for more than a few days. With short mild winters the summers are correspondingly long with warm temperature but the climate is dry and the nights are nearly always cool. The annual average temperature of 61.6° Fah., varies throughout the state from 54° Fah., to 65° Fah.

Transportation

OKLAHOMA, the youngest of the Southern states and the second largest, has extensive and well distributed transportation systems. The railroads, operating a total mileage close to 7,000 miles, provide adequate passenger and freight service to virtually every one of the State's seventy-seven counties. Of the total mileage, all but a few miles are operated by twelve Class I roads which provide trunk lines from East to West and North to South.

With the increased use of trucks and busses for freight and passenger conveyance, highways are an important factor in the State's progress. The total mileage of Oklahoma's state highway system at the close of 1938 was in excess of 8,000 miles, made up of approximately 3,300 miles of hard surface roads, 3,700 miles of treated and untreated gravel roads and only about 1,100 miles of dirt roads.

Though Oklahoma has a network of rivers, water transportation has been limited to shallow draught vessels, but projects are under way to make part of the Arkansas and Red rivers navigable for a limited distance. When this is completed, access can then be made for direct shipments to Gulf Coast ports.

In the matter of air transport Oklahoma is well provided with main line service directly to, or connecting with, virtually every part of the country.

Manufactures and Finance

ACCORDING to figures recently made public by the Bureau of the Census, the value of Oklahoma's manufactured products in 1937 amounted to $366,088,721, an increase of $85,412,506 over the 1935 total of $280,676,215. The industry which ranked first in value of manufactured products in 1935 (figures for 1937 are not yet available) was petroleum refining with $106,689,449. Most important among the other twenty one industries listed with a value exceeding one million dollars was meat packing, $37,356,642; flour and other grain mill products, $33,983,590; butter, $11,812,505; oil, cake and meal from cottonseed, $5,727,340; glass, $5,594,975; and zinc smelting and refining, $5,245,884.

The total payroll in 1937 for all industries amounting to $34,390,477 was distributed among 29,551 employees in 1,428 establishments. Cost of materials, fuel, electric energy and contract work was $255,470,399.

The extent of decentralized industry in Oklahoma is evident from the fact only one of the state's 77 counties is without a manufacturing establishment.

The total deposits held by 398 banks reporting to the Comptroller of the Currency on June 1, 1938, was $445,844,000, of which $350,616,000 and $90,373,000 was demand and time deposits respectively. Capital stock including capital notes and debentures totaled $28,800,000. Total assets were $499,503,000. Oklahoma bank clearings as represented by reporting exchanges in 1937 amounted to $698,687,000, an increase of $60,394,000 over the 1936 figure of $637,293,000. The total internal revenue collected during the calendar year 1937 was $58,266,064, the income tax receipts alone accounting for $19,338,891.

Agriculture

THE total cash farm income in 1937 amounting to $186,155,000 placed Oklahoma fourth among the Southern states and was an increase of $37,317,000 over the comparable figure for 1936. Of this total cash farm income, $89,168,000 was derived from crops and $82,322,000 from livestock and livestock products.

Among crops, wheat was the most important and the cash income of $46,250,000 from 4,610,000 acres yielding 65,462,000 bushels was the largest in the entire South. The production of 773,000 bales of lint cotton from 2,471,000 acres yielded a cash income of $20,700,000 while from cottonseed was derived an additional $4,400,000. Another important crop is oats, of which 27,347,000 bushels were produced.

Oklahoma also produces a large quantity of other farm crops such as corn, peanuts, sweet potatoes, etc., suitable for commer-

cial use but, in addition, there have been grown or are growing in the state an extensive variety of plants from which well over fifty different drugs are obtained, many of them being quite rare.

Livestock and livestock products are almost equally as important as crops in Oklahoma and nearly half the cash farm income is obtained from this source. In 1937, the total number of horses, mules, sheep, swine and cattle numbered 3,800,000 and was valued at $105,749,000 of which more than half consisted of cattle numbering 2,139,000 with a value of $56,197,000.

Timber

ALTHOUGH Oklahoma often is regarded as a prairie state, a considerable area of native forest land extends from the Southern pine region of the southeast to the western boundaries of the state where post oak and some other types prevail.

In 1930 the U. S. Forest Service estimated the forest area of Oklahoma at 4,279,000 acres including 1,800,000 acres of saw timber amounting to 3,542,000,000 board feet in the proportion two-thirds hardwood and one-third softwood. More recently Ernest L. Little of the Oklahoma Farm Chemurgic Council has compiled a preliminary report of the state's forest area and resources. In addition, the U. S. Southern Forest Survey has completed a survey of the extreme southeast.

According to Mr. Little's report, approximately 12,000,000 acres are designated as forest land, part of which still is virgin forest. The largest portion, comprising about 6,000,000 acres are of the Black-jack post-oak type. The most important commercial type is shortleaf pine-oak and covers some 4,000,000 acres. The remaining 2,000,000 acres are of the oak-hickory type.

The number of trees indigenous to Oklahoma is 134, the majority of which are hardwoods and include black walnut, hickory, beech, birch, oaks, elm, sycamore, and basswood. The softwoods consist of shortleaf pine, red cedar, western yellow pine and some loblolly pine.

The area covered by the U. S. Southern Forest Survey, embracing five counties, was 4,026,200 acres. Of this area nearly 75 per cent is forest land and contains 2,514,200,000 board feet of pine or 7,000,000 cords of sound pine on 2,961,000 acres. Pure upland and river bottom hardwoods are found on 1,577,-200 acres; hardwoods mixed with pine on 686,300 acres; and pure stands of pine on 697,500 acres.

Minerals

ON the accompanying map appears an outline of the chief commercial development of mineral resources in Oklahoma. Some minerals, such as gypsum, volcanic ash, caliche, clays, limestones plus others, are present in great abundance over a much wider area than indicated on the map showing areas of production.

In addition, the following materials are known which are not being utilized commercially at present:

Magnetite and hematite in Comanche and Kiowa Counties. Some low grade hematite ores have been mined. Extent of magnetite and hematite deposits are not fully known, but recent studies indicate magnetite at least to be more extensive than formerly believed.

Wool rock is available in several sections of the state as a result of recent research by the Oklahoma Geological Survey.

Kaolin clays of commercial importance have not been utilized in Oklahoma, but recent analyses of samples from Le Flore and McCurtain Counties indicate the presence of these clays. Additional research will be required to demonstrate their value.

Grahamite was formerly mined in Atoka and Pushmataha Counties, and considerable quantities of the material are known in these and adjacent counties.

Dolomite deposits of Oklahoma have not been extensively utilized for the technical and special uses of the mineral although large deposits of high grade are present in the Arbuckle Mountain area in Johnston and Murray Counties and beds of dolomitic rock are present in several western counties.

Manganese is found as black sands, especially in the central part of the state, with most promising deposits in Garvin and Pottawatomie Counties, and some ore is known from the Arbuckle and Ouachita Mountain areas. Commercial possibilities of the manganese sands will depend on further work to determine the extent and grade of the material.

Coke for domestic fuel was made extensively in Oklahoma before the advent of natural gas as domestic fuel but it is not now being made. Research on the value of Oklahoma coke for metallurgical purposes will be started within the next year.

In addition to dolomite, there are possibilities of fire clays in association with coal beds, and considerable quantity of novaculite and other silica materials which offer possibilities as refractories.

Brines: Oil field brines are going to waste in the large oil producing areas of Oklahoma, and brines from deep wells can be obtained in most all parts of the state. Some use has been made of these brines in the manufacture of chemicals, and during 1934-1935, Oklahoma ranked second in the nation's production of Magnesium salts and Calcium-Magnesium chloride, made from brine.

Phosphate nodules and rock are found in a few areas, and a number of deposits of phosphatic limestones which may have value for agricultural purposes are known.

Barite is found in various forms in Oklahoma; as sandbarite crystals in central Oklahoma, barite nodules in south-western Oklahoma, and a deposit of barite ore is reported from the Arbuckle Mountains.

Zircon crystals are found in a small area in the Wichita Mountains, and with the increasing demand and value of zircon for metallurgical purposes a closer search for commercial quantities of the mineral may be justified.

Electric Power

ELECTRIC power facilities, which are available throughout the state, consist of 100 plants operated by 55 companies with a total generating capacity of 331,334 kilowatts. There are 27 steam power plants with a capacity of 289,487 kilowatts, 67 internal combustion plants capable of 37,591 kilowatts, 4 combination plants whose capacity is 3,056 kilowatts, and 2 hydroelectric plants with a rated capacity of 1,200 kilowatts. The network of connecting interstate transmission lines assures an adequate supply of power to meet unforeseen demands.

Production of electric power in 1937 by public and private plants totaled 1,098,459,000 kilowatt hours, an increase of 162,-921,000 kilowatt hours over the previous year. Of this amount 1,096,788,000 kilowatt hours were produced from fuel operated plants and only 1,671,000 kilowatt hours originated from hydroelectric plants. According to preliminary figures, production of electric energy declined for the country as a whole in 1938 and only two regions increased. The region in which Oklahoma is situated remained almost unchanged.

Taxation

OKLAHOMA state taxes as they apply to industry at the present time consist principally of three items. The first of these is the corporation income tax of six per cent. The second is the franchise tax levied on all domestic business corporations based on the amount of capital stock issued and outstanding in January of the preceding year, the rate being $10 on $5,000 or less and $1.00 per $1,000 on all excess up to $50,000. Beyond this amount and up to $100,000 the rate is $1.00 per $2,000, with $20 for a further excess up to $250,000. Over $250,000 there are similar levies for additional increases ranging up to $100 for each $5,000,000 excess over $10,000,000. Foreign corporations are levied at the rate of $25 for every $50,000 up to $500,000 of capital employed within the state. Over $500,000 but not exceeding $5,000,000 there is an additional levy equal to 1/40 of one per cent on the excess; over $5,000,000 the additional amount is at the rate of $30 for each excess million.

Finally, there is a gross production tax on asphalt, ore bearing lead, zinc, jack, gold, silver, copper, petroleum, natural gas and casing-head gas at the rate of three per cent on gas and oil, and half of one per cent on other minerals. Also, until June 30, 1939, there is an excise tax on one eighth of one per cent levied on each barrel of petroleum oil produced.

Labor and Wages

WITH a density of 34.5 persons per square mile, the population of Oklahoma is fairly evenly distributed, though the petroleum industry has tended to draw more people within its areas than elsewhere. Oklahoma has only two cities with a population exceeding 50,000, Oklahoma City has close to 200,-000 and Tulsa is approaching 150,000, the latter city having doubled its size in the decade between 1920 and 1930. The rural population still comprises the major classification with 65 per cent. The total native born white population is 98.7 per cent of which 93.9 per cent are American born of American parentage.

Throughout the state there is a plentiful supply of labor both skilled and unskilled with rates of pay varying, with the community and type of industry. In conformity with the Wage and Hour law the minimum rate for unskilled work is 25 cents per hour. In Oklahoma City, unskilled labor ranges from 25 to 50 cents, the latter being the prevailing rate paid by the packing industry. Semi-skilled pay varies from 38 to 55 cents while skilled labor rate of pay ranges from 55 to 98 cents an hour with exceptions in some of the technical industries where the average may be $1.20 or over.

OKLAHOMA

Its principal raw materials and transportation facilities offering opportunities for industry, with additional facts on the reverse side pertaining to industry and its growth within the state.

Minerals ***Counties in which material is commercially produced***

Asphalt—62, 63, 69
Bentonite—15
Caliche—2
Cement—10, 63
Chats—13
Chemicals—9, 10, 31, 39
Clay (brick)—19, 30, 31, 32, 36, 40, 49, 63
Clay (pottery)—63
Coal—11, 20, 21, 31, 32, 39, 40, 51, 52, 64, 65, 66, 67, 73
Crushed stone—8, 9, 29, 31, 58, 62, 65, 71, 73, 76
Gas (alone)—2, 4, 11, 32, 65, 66, 67
Gas and Oil—7 to 11, 17 to 20, 28 to 32, 36 to 40, 42, 44, 45, 47 to 50, 55, 57 to 61, 63, 64, 68, 69, 72, 73
Glass sand—63, 71
Granite—54, 55, 58
Gypsum—26, 56
Lead—13
Lime (high calcium)—13, 34, 44, 71
Sand and gravel—5, 7, 8, 11, 19, 21, 27, 31, 33, 35, 36, 38, 40, 45 to 50, 54, 55, 57, 58, 61 to 63, 71

Sandstone—7, 10, 28, 51, 64, 65, 67, 73
Salt—5, 42, 53
Tripoli—13
Volcanic ash—15, 32, 50
Zinc—13

Agricultural Products

Corn—all counties
Cotton—6 to 9, 11, 12, 14 to 21, 23 to 77
Peanuts—10, 16, 29 to 33, 36 to 41, 44 to 50, 52, 57, 58, 60 to 71, 74 to 77
Soybeans—11 to 13, 19 to 22, 25, 30 to 32, 39, 40 51, 63, 67
Sweet potatoes—1, 4 to 58, 60 to 77
Some flax, sugar cane and tobacco is also grown in addition to other farm crops

Timber

Loblolly—shortleaf pine— 13, 22, 31, 41, 65, 66, 67, 73, 75, 76, 77
Oak and other hardwoods—4 to 41, 43 to 52, 55, 57 to 77

Natural gas is available for consumption in the following counties: 2, 5 to 21, 23 to 32, 35 to 76

——— **Railroads**
——— **Airlines**
■ **Airports—also at principal cities printed in red**

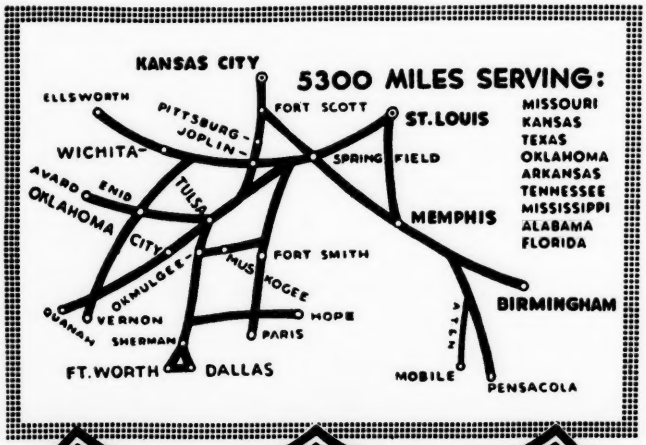
FRISCO FIRST

in Oklahoma

As the pioneer in railroading in Oklahoma, Frisco Lines were first in aiding the opening of this youngest state of the Union. Today, Oklahoma, still retaining its romance of cattle, agriculture and oil, has gained a commanding position as one of the principal INDUSTRIAL and MANUFACTURING states in the Midcontinent section of the country.

Through the progressiveness and farsightedness of its citizens, Oklahoma now continues in phenomenal strides toward its newest goal—a Midcontinent industrial empire. The present construction of a more than $20,000,000 dam in the northeast section with turbines to generate more than 64,000 kilowatts, when completed, is further evidence of the determination of Oklahoma in its industrial march forward.

The FRISCO, with its network of lines serving this great state, is proud of its part in the progress of Oklahoma, and now enjoys a position of strategic advantage to further assist in this industrial development. The Frisco serves not only the large industrial centers, the cotton, coal and oil fields but also taps many sources of raw materials, resulting in a substantial reduction of industrial production costs. When you travel or ship, think of Frisco first.



Inquiries for industrial locations will receive prompt handling by

Industrial Department, Frisco Lines
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FRISCO FASTER FREIGHT

The Forest As A Source Of Man's Needs—*Supplying Clothing, Food, Power, And* Shelter

BY

Dr. J. Samuel Guy
Professor of Chemistry,
Emory University, Ga.

VERY few people realize the enormous debt that industry owes to our forests—past and present—and the debt to the future depends upon whether or not the existing forests be exterminated, preserved, or improved. Most of the power from coal, petroleum, and natural gas which is now used to turn the wheels of industry comes from the results of our forests of the distant past. How long this storehouse may last is difficult to answer, but not always to say the least.

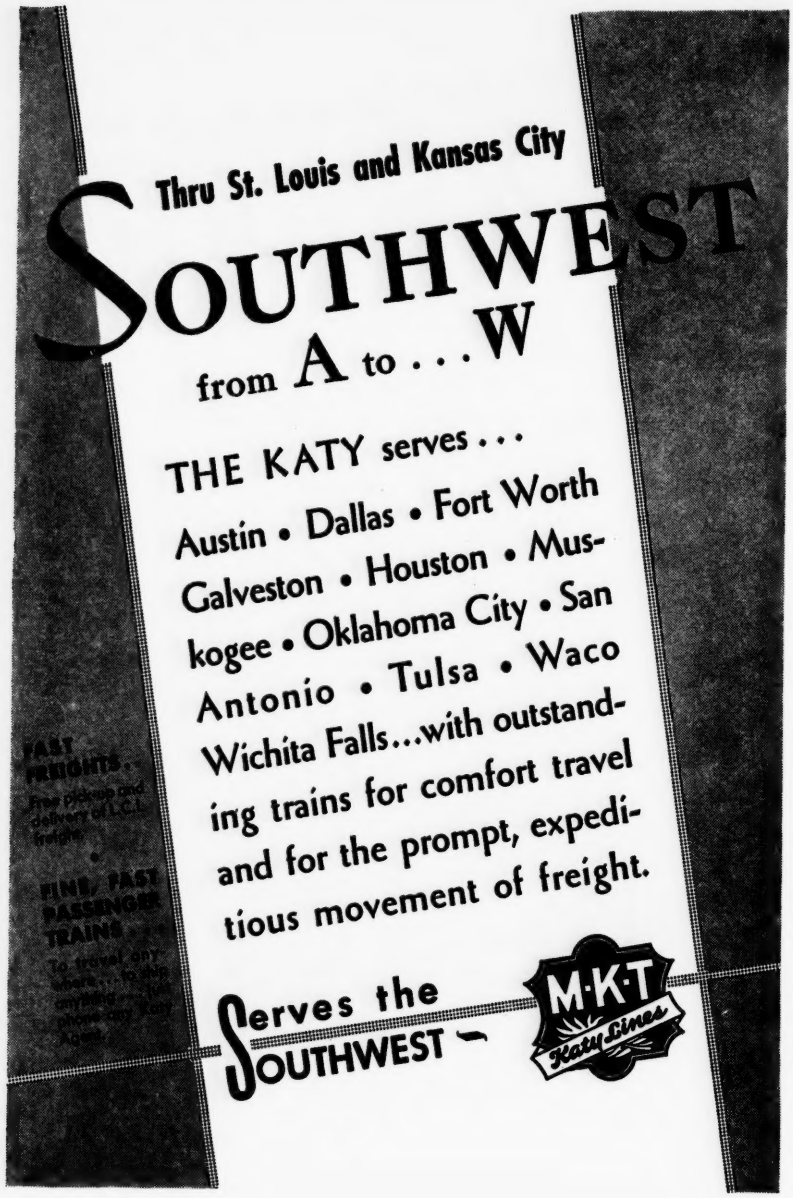
The chief factors involved in the carving of our great nation have been the courage and industry of the settlers, the coal and minerals hidden in the earth, and the great virgin forests that everywhere covered the continent. Large quantities of these natural minerals have been scraped up and scattered over the face of the earth. Navies and war munitions, bombs and tanks of other nations none too friendly to America and her ideals are made from these very treasures that once were hidden beneath the soil upon which, this, the only free nation, was builded.

Four-fifths of the forests of our nation have been destroyed, but the picture here is not so pathetic as it might seem, for there is a strange justice within nature. She has a way of rebuilding these forests from the waste products of industry. A growing tree builds its own tissue and substance from the carbon dioxide and water of the air and the energy of the sun. We call this photo-synthesis. Thus nature has given us through this cycle the very important method of storing energy from the sun through the building of cellulose which is the substance of the tree, and when this substance is burned to furnish energy to move the wheels of industry, carbon dioxide and water are poured back into the atmosphere for the building of another tree.

Homes from Trees

It is regrettable that every person cannot understand that a growing tree is in reality a necessary step in the preservation of the power balance upon which industry moves. Reforestation is an absolute necessity as a power unit in the progress of civilization. But we must not think of our forests only as a source of power; they must furnish man with materials from which to obtain food, shelter, and clothing. Our ancestors slaughtered trees by the thousands to build for themselves shelters of logs. Modern industry is substituting more enduring building material for these wooden shelters, but in reality the heat which is used in the manufacture of these new building materials comes from the very same photo-synthetic chemical changes carried on in the trees of a million years ago. The heat required to change the clay of the soil into brick, tile, and cement comes from

(*Continued on page* 60)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Railway Expenditures In Oklahoma Exceed $31,000,000 Annually

THE importance of the railroads in the economic life of Oklahoma is strikingly illustrated by the fact that in 1937, the railroads expended over $31,000,000 for materials, supplies, fuel, labor, and taxes without including a considerable sum for miscellaneous purchases and services.

This month Oklahoma celebrates the 50th anniversary of the most memorable day in its colorful history—the day of the great "Land Rush"—when a Presidential Proclamation opened the first tract of unoccupied Indian Territory to white settlement.

On that day, April 22, 1889, there were already some 1,200 miles of railroad in what is now the State of Oklahoma for the "Iron Horse" made its triumphant entry into the old Indian Territory with the opening of the railroad to Vineta on September 1, 1871. In the years that followed, other lines were pushed across the territory to link St. Louis, Kansas City and Fort Smith with the rapidly growing Southwest.

In the decade from 1890 to 1900 Oklahoma's railway mileage increased from 1,213 to 2,150 miles, and in the next ten years it nearly trebled, mounting to 5,798 miles in 1910. Today Oklahoma is served by approximately 6,700 miles of railway lines and provide the people of Oklahoma with direct transportation service to and from every part of the country.

Railway development and railway transportation have been of fundamental importance to the agricultural, industrial and commercial development of Oklahoma.

A few months ago the Association of American Railroads and the Railway Age made a nation-wide survey of railway purchases to ascertain where the railroads were spending their money and what they were spending in each state. The inquiry developed some interesting facts. For instance, it was found that the railroads spent $10,057,000 in Oklahoma in 1937 for fuel and materials and supplies. Purchases were not confined to a few of the larger cities and towns, but extended into 293 cities and towns located in seventy-four counties of the state. These purchases were made by seven railway systems operating in the state and forty railway companies which operate no mileage in the state.

Railroads are among the country's largest users of fuel oil. Their 1937 purchases of fuel oil throughout the country totaled 68,740,000 barrels, or about one-sixth of the total domestic consumption. A substantial part of this oil was produced in Oklahoma.

In addition to fuel oil, the railroads reported purchases in Oklahoma of lubricating oils and other petroleum products, greases, coal, forest products, cross ties, lumber, foundry products, cast iron pipe and pipe fittings, locomotive and car parts, ballast materials, sand and gravel, commissary supplies, ice, hardware, tools, tool handles, stationery and printing, and office supplies.

The reported $10,057,000 spent in Oklahoma in 1937 for fuel, materials and supplies does not take into account large sums spent by the railroads for such miscellaneous services as electricity, water, telephone service, rents, attorneys' fees, laundry service, money paid to contractors, traveling expenses, payments to truckers in connection with pick-up and delivery service, and advertising. Nor does it include expenditures of the Railway Express Agency, refrigerator car companies, and other companies closely allied to the railway industry.

In the five-year period 1933-1937, railway payments to state, county, city and town tax collectors in Oklahoma have averaged approximately $1,000,000 every three months, or $4,000,000 a year. A study made some time ago showed that 51.6 per cent of all railway taxes in Oklahoma then went to support the public

(*Continued on page* 66)

Paper Making in the South—*A Brief History*

BY

E. Morrell

SINCE 1930 there has taken place in the South the greatest expansion of the pulp and paper industry ever known in any region. With the use of Southern pine for newsprint and other white papers, a development in which the late Dr. Charles H. Herty accomplished so much, came realization of the opportunities in the South. Within two years over $100,000,000 was invested in new pulp and kraft paper plants besides the mills now under consideration or in course of construction, among the latter being the South's first newsprint mill at Lufkin, Texas, the South's first cigarette paper mill in western North Carolina, and the large rayon pulp mill at Fernandina.

It is not generally realized that the paper industry actually has been in existence in the South only five years short of 200, for it was in 1744 that the first Southern paper mill was established at Williamsburg, Virginia by William Parks.

Parks, an Englishman, first settled in Annapolis, Maryland, and there started the *Maryland Gazette* in 1727, remaining till 1733 when, at the invitation of the college authorities, he moved to Williamsburg and set up a book store. Three years later, in 1736, he commenced publishing, on his own printing press, the *Virginia Gazette*. Presumably because of the high cost of paper almost all of which had to be imported from England since the output of paper mills in northern colonies was insufficient for their own needs, Parks erected his own paper mill in 1744 on a branch of Archer's Hope Creek. This mill, which it is believed was still in use in the early 1770's was poetically heralded in the *Virginia Gazette* of July 26, 1744.

Evidence of the success of Park's venture is found in the fact that, upon his death during a return voyage to England in 1750, he left an estate valued at £6,211 15s 9d.,—a considerable amount in those days.

The second mill in the South was that at Salem, N. C., established by the early German Moravian settlers about 1766 and continued in use until early in the 19th century.

Further development of the paper industry did not occur till the Revolution brought its concomitant shortage of everyday commodities that was felt throughout the colonies. Paper was particularly scarce and especially in the South. As a result, manufacture of paper was given every possible encouragement by the various legislative bodies and as early as 1775 the North Carolina congress resolved that a premium of £250 be given to the first person who, within 18 months, should erect a mill and produce to the provincial Council 30 Reams of Brown, 30 Reams of Whited brown, and 30 Reams of writing paper equal in quality to that imported from England at 2s 6d., 3s 0d., and 8s 0d., per ream respectively. However, it was not till December, 1777 that John Holgan petitioned the congress to grant him the premium if he produced the paper within eight months. This was granted, but in August, 1778, Holgan requested an additional six months because he did not have the full quantity of paper due to lack of water. Whether he finally fulfilled the requirements and collected his money is not known now, but as early as November, 1777 an advertisement appeared in the *North Carolina Gazette* appealing "for rags for the Paper Mill just erected near Hillsborough in Orange County."

In the meantime the provincial congress of South Carolina passed a resolution in November, 1775, offering a premium of £500 to the person producing three good reams of paper made in the Colony's first mill. Probably as a result of this appeal, William Bellamy obtained a loan of £3,000 for five years from the congress in March, 1776, in order to erect a paper mill. Similarly, in June, 1776, the Maryland Council of Safety ordered that £400 be paid to James Dorsett as a loan for two years—so that he might erect a paper mill.

An indication of how scarce paper had become is seen in the statement of James Davis, the North Carolina printer, who in 1780, informed the state assembly that paper was selling in Newbern at £80 to £100 per ream, an excessive price even if allowance is made for the variation in value between pound sterling and the colonial pound. Certainly paper was both scarce and expensive and continued to be until long after the close of hostilities. But eventually foreign trade returned and there was a rapid dwindling of mills in the new United States for as a general rule the paper could not compete in quality with European manufacture. Most of the recently erected mills were small, of poor construction and ill equipped as to capital, equipment, and experienced help while a scarcity of material—rags—was for many years, past and future, a severe hindrance to the expansion of the industry. Consequently many of these mills soon passed out of existence particularly in the South, though there were a few mills which continued to thrive.

The methods employed were extremely primitive and all work was, of course, done by hand. To prepare the pulp the rags were beaten by a heavy hammer usually wielded by hand and virtually nothing else was done before the pulp was ladled into moulds and then couched in thin sheets on a felting cloth and subjected to heavy pressure before being hung up to dry. Subsequently, and when the water was sufficient, it became possible to mechanically reduce the labor of making the "stuff" and also to provide a vat of pulp sufficiently large to sink the mould in just as hand-made paper is moulded today. Where circumstances permitted, the white rags were segregated and retained for white paper, but too frequently colored rags were allowed to go in with the white thus producing the dark hue still seen in some surviving papers of those days. Bleaching was virtually unknown except for the occasional addition of some blueing, while water was used in its natural state though attempts were made to select sites where good clear water was available. Calendering was quite unknown. Machinery, which was introduced in Europe as early as 1760 was not used in this country till long after that time. What the price of rags was in the South is not known but in New England in 1777, the price was 3d., a pound. In 1778, the price rose to 8d.; in 1779, to 12d., 18d., and 2s 0d.; in 1780, the price was 3s 6d., and in 1781, it reached 10s 0d. In 1792, it had reverted to 3d.

Between the close of the Revolutionary War and 1800 there appear to have been only two attempts to erect new mills in the South. The first of these was in North Carolina in 1789, when Gottlieb Schober and others petitioned the legislature, and were granted a loan of $300 free of interest for three years. The second was far more important, for in 1791 a Baptist preacher named Elijah Craig, together with his partners, Parker and Logan, started construction of a mill near Georgetown, Kentucky, which when it eventually began production early in 1793, had the distinction of being the first paper manufacturing enterprise west of the

Susquehanna. This mill which was burned down in 1837, a fate common to many mills of the time, had a mill house 40 feet by 60 feet and two and a half stories high. The structure was of wood with a stone basement.

Fluctuations in manufactures in the early years of the Union were far from being uncommon, but it is doubtful if many suffered as did paper making. As already pointed out, the number of mills declined after 1783, until in 1800, it is estimated there were only 100 mills in the entire country. Following the turn of the century conditions improved so that in 1810 there were 9 mills in Maryland producing 22,200 reams of paper annually valued at $75,515; 4 mills in Virginia producing 3,000 reams valued at $22,400; 6 mills in Kentucky with 6,200 reams valued at $18,600; North Carolina had 3 mills producing 2,400 reams worth $6,000; while Tennessee, South Carolina and the District of Columbia were credited with two, one, and one, respectively. Another source states that Maryland only had three mills, an obvious understatement. At this time most of the mills had two vats capable of making from 2,000 to 3,000 reams of paper per year. Such a mill required a capital of $10,000 and gave employment to about ten people.

With the advent of war in 1812, the industry again suffered losses, for in 1820, there were no mills operating in Virginia, South Carolina, Georgia or Arkansas and the number had been materially reduced in the other Southern States, even if we do not accept the admittedly underestimated census figures crediting Maryland with 5, District of Columbia 1, North Carolina 1, Tennessee 2, and Kentucky 1. Actually, Kentucky had six mills in 1812, one of which was operated part of the year by steam. In 1820, most mills were still only equipped with two vats, but values had changed and such mills were then only figured at $3,000 to $5,000.

Although early paper manufacturing in Tennessee is largely shrouded in obscurity, it is known that several attempts had a short or peripatetic existence and as early as 1809 and 1811, legislative acts were passed to encourage the making of paper. The earliest factual data is that concerning the Whiteman family. W. S. Whiteman went to Knoxville about 1806, but it was not till about 30 years later that, with machinery hauled in wagons from Philadelphia, he built a mill some four miles outside the city and continued to operate it until he died in 1840. Whiteman's son, W. S. Whiteman, Jr., who possessed a thorough knowledge of the industry, joined a group of other men who had already established a mill on the banks of the Cumberland river at Nashville. Later, this mill was moved to another location nearby on White's Creek while the same men also built another mill on Paradise Ridge. The first Nashville mill eventually passed into the possession of the Rock City Paper Manufacturing Company. At the outbreak of the Civil War there were several mills in Tennessee operated by the Whiteman family, the largest of which, at Fort Donelson, supplied the majority of the official Confederate requirements right up until the fall of that city in 1862 after which it continued to operate without interruption day or night except to clean the boilers. The six mills operating in Tennessee in 1840 with a combined capital of $103,000 and annually producing paper valued at $60,000 had, by 1860, been reduced to two—two of only twenty-four mills in the entire South.

Sometime during the first decade of the 19th century Isaac Yarnall erected two single vat mills a few miles west of Lexington in Kentucky, and a one-vat mill also was started in Logan county. A directory of 1817 stated there were several paper mills in Kentucky and that two mills in Lexington were operated by steam. In 1814, the first mill was built in Louisville by Jacob & Hicks. The Franklin mill on the Elkhorn, completed in 1821, was an enterprise of Amos Kendall, later appointed Postmaster General by Andrew Jackson. Subsequently this mill was operated by E. H. Steadman before it was acquired in 1875 by Dupont & Co., who moved the machinery to Louisville.

It is a regrettable fact that, prior to the Civil War, efforts to develop a paper industry in the South were generally unsuccessful and few of the mills established were able to utilize the mechanical improvements designed and proved in the first half of the century. In this respect Kentucky was no exception. The second mill erected in Louisville around 1832 was nothing else than a converted saw mill and was burnt down very shortly. The third mill in Louisville fared better. Originally built in 1836 and operated by Nixon & Kellog, it was rebuilt in 1840, and after several ownerships eventually became the property of Dupont & Co. Another Kentucky paper mill served that purpose for only a year or two before reverting to its original function as a flour mill.

The first mill in what is now West Virginia was built at Wheeling in 1830 by a Methodist preacher named Lamden, whose son, Christopher, had a wide experience of the trade in both hand and machine-made paper. Like so many of the early mills this was burnt down in a few years, but was rebuilt in 1836 and known as the Virginia mill.

According to the decennial census of 1840 there were no mills operating in Alabama, Arkansas, Florida, Louisiana, Georgia, Mississippi, Missouri, or Texas, and these same states, except Alabama, were still without mills in 1850. Whether it was due to an inaccurate census or the temporary existence of Southern mills is not known, but it is interesting to note that in 1846 a Georgian stated there were no mills in Georgia or Alabama and only a small supply came from two mills in Greenville, S. C. Again, the publishers of the New Orleans *Bulletin*, in 1847, boasted of the fact that the paper then being used by them was of their own manufacture; yet this mill was not mentioned in the 1850 census and there were only 15 mills located in six of the 11 states which seceded, the largest of which, at Augusta, Ga., burned down in 1863.

During the Civil War the scarcity of paper was extremely acute. Newspapers

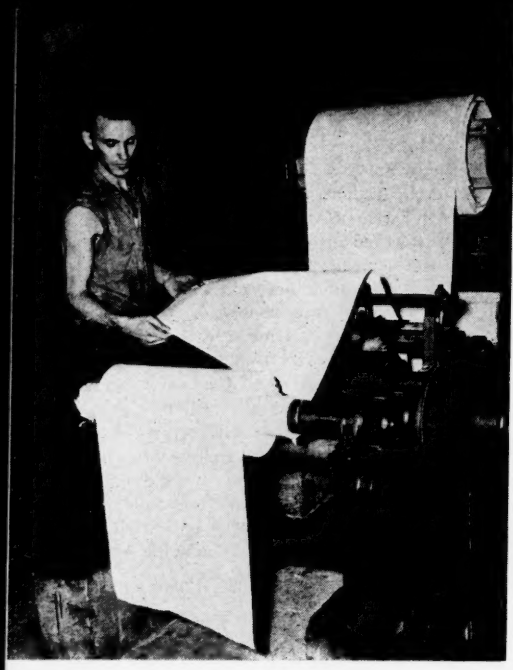
(*Continued on page* 44)

ADVERTISEMENTS.

PAPER MANUFACTORY.

BY our unhappy Contest with *Great Britain*, and the neceſſary Reſtrictions on our Trade, Paper has been an Article for which we, in this State, have much ſuffered, for though there are many Paper-Mills in the Northern Colonies, where Paper is made in great Perfection, yet, by the Interruption of the Colony Trade by Water, the Southern Colonies have experienced a very great Scarcity of that neceſſary Article. To remedy this Evil, and throw in their Mite towards the Perfection of *American* Manufactures, the Proprietors of a PAPER MILL juſt erected near *Hillſborough*, in *Orange* County, give Notice to the Public, that their Mill is now ready to work, and if a ſufficient Quantity of Rags can be had, they will be able to ſupply this State with all Sorts of Paper. They therefore requeſt the Favour of the Public, and more particularly the Miſtreſſes of Families, and the Ladies in general, whoſe more peculiar Province it is, to ſave all their Rags and Scraps of Linen of all Sorts; old Thread Stockings, Thrums from their Linen Looms, and every Kind of Linen, is uſeful. As this Undertaking is novel, ſaving of Rags may perhaps be thought too trifling, and below the Notice of the good Matrons of this State; but when they conſider they are aiding and aſſiſting in a neceſſary Manufacture, and when the young Ladies are aſſured, that by ſending to the Paper Mill an old Handkerchief, no longer fit to cover their ſnowy Breaſts, there is a Poſſibility of its returning to them again in the more pleaſing Form of a Billet Deaux from their Lovers, the Proprietors flatter themſelves with great Succeſs. Perſons in the ſeveral Towns and Counties in the State will be appointed to receive Rags, for which a good Price will be given

An advertisement which appeared in the North Carolina Gazette of November 26, 1777, for rags to be used in one of the South's earliest paper mills at Hillsborough, N. C.



Pulping Of Southern Hardwoods At The Herty Foundation Laboratory

BY

Charles Carpenter,

Technical Director

IN addition to 500,000,000 cords of pine the Southern forest resources encompass approximately another 500,000,000 cords of hardwoods. About half of this volume of hardwood timber consists of the so-called pulping hardwoods such as black and tupelo gums, red gum, cottonwood, yellow poplar, willow, bay and soft maple, while the other half consists of such denser woods as the oaks, hickories, ashes and elms.[1]

Certain of these woods are now used by Southern pulp and paper mills. The consumption, however, is comparatively small and in no way commensurate with the volume of raw material. More extensive use of the hardwoods has awaited two corollary developments: first, the development of technical knowledge concerning the processing of the hardwoods for grades other than brown wrapping and fiber container board; and second, increased manufacture in the South of these grades once the practicality—technical and economic—has been soundly demonstrated.

The possibility of these developments has appealed to the economist in search of a more balanced use of Southern forest resources and to the pulp manufacturer in search of a wider source of raw material. As a result, the technical development of the hardwoods has engaged the attention both of the many laboratories of the paper industry and of public research organizations such as the Forest Products Laboratories at Madison, Wisconsin, and the Herty Foundation Laboratory at Savannah, Georgia. The experimental and demonstration work of the Herty Foundation Laboratory with the Southern hardwoods is described in the following.

[1]U. S. Forest Survey, Southern Forest Experiment Station, New Orleans, La.

Sulphate Pulping

Black Gums and Red Gum: The swamp black gum (Nyssa biflora), tupelo (Nyssa aquatica) and the red or sweet gum (Liquidambar styraciflua) pulp readily by the sulphate (or kraft) process, giving higher yields with less consumption of chemicals and steam than do the Southern pines.[2] In bleaching, the gums likewise show certain advantages over pine in the matter of chlorine consumption, which is about one-half, and the relative ease with which they are brought to high color.

On the papermachine these gum pulps form well at relatively high freenesses, making possible tightly closed sheets with a minimum of cutting and refining action. As a consequence, such mullen strengths as 35-45 points (20 substance sheet) have been secured, while tear values have been maintained at 65-95 grams (16 ply). These desirable papermaking characteristics of the gum sulphate pulps are as cribed to the fineness and medium length of the fiber (mean length 1.8-mm).

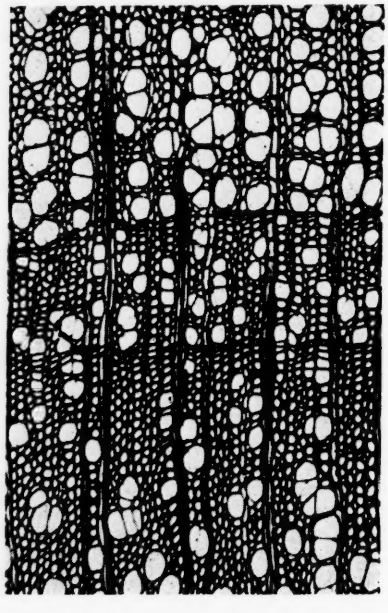
Other Species: The other "pulping" hardwoods (cottonwood, willow, bay, etc.) as well as the denser woods (oak, hickory, etc.) are reduced by the sulphate process. Pulps therefrom resemble the usual soda pulps and would probably find their most extensive use in admixture with long-fibred pine pulps.

Sulphite Pulping

Gums and Cottonwood: In pulping hardwoods by the sulphite process the number of species which lend themselves readily is less than in case of sulphate or kraft pulping. These more tractable woods make up the "pulping" hardwood group.

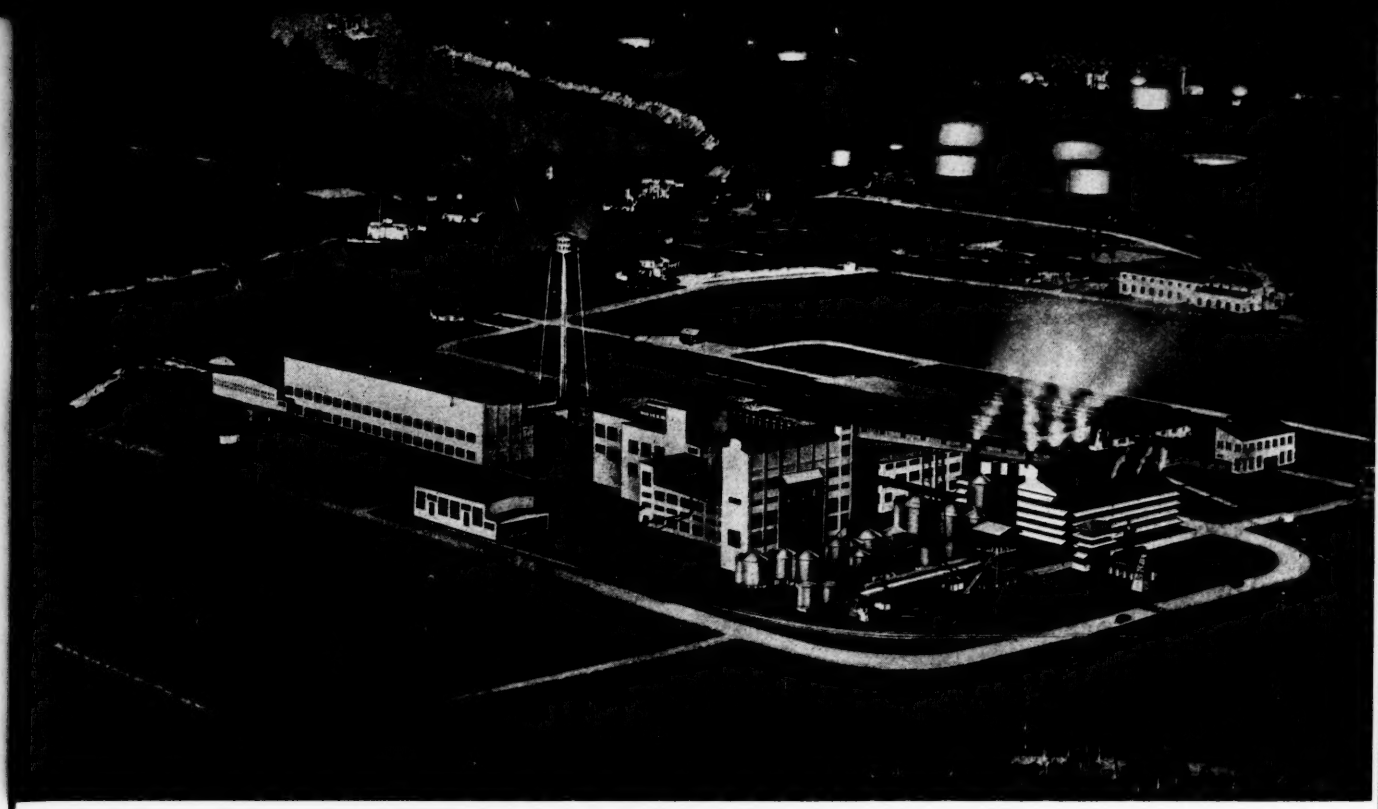
Black gum, tupelo, red gum and cottonwood (Populus deltoides virginiana) yield on soft and uniform cooking a wood cellulose with the chemical characteristics of a viscose-type pulp. Alpha cellulose content is 90-91 per cent, viscosity 20-30 centipoises, copper number 1.5 to 3.0 and color 85 to 90. In processing into viscose, however, difficulties are encountered in steeping and shredding, traceable to the short fiber of the hardwoods. The addition of 10-15 per cent of pine

(*Continued on page* 59)



Top—Black gum bleached sulphate bond on the rewinder of the experimental machine at Herty Foundation Laboratory.

Right—Southern swamp blackgum is the most promising southern wood for grades other than brown wrapping and kraft container board (Courtesy Dept. Wood Technology, N. Y. State College of Forestry)



Processes Used In The Southern Pulp And Paper Industry

BY

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RELIABLE information shows that the South made over 75 per cent of all the sulphate pulp produced in the United States in 1937. On the other hand, the South made but 3 per cent of the sulphite pulp manufactured in the United States in spite of the fact that as much sulphite as sulphate was made in this country. Why is it that the South has so strongly favored the sulphate process? The answer is found in an examination of the processes themselves. Wood can be considered roughly as composed of cellulose, or the wood pulp fibres which we desire; lignin, which is the material we must dissolve out of the wood in order to liberate these fibres; and water-soluble or semi-water-soluble substances which are rather easily or partially dissolved in hot water. The problem in obtaining chemical wood pulp, therefore, is in finding methods to dissolve away the constituents of wood other than cellulose and at the same time to avoid injuring the cellulose fibres themselves.

There are four important processes for obtaining pulp from wood, namely, the groundwood or mechanical process, and the three chemical processes, soda, sulphate and sulphite. The groundwood process is solely mechanical and consists of pressing a log of wood against a revolving grindstone kept wet with water. The stone has a rough surface on its face to assist in cutting the wood fibres away from the log. Newsprint is over 75 per cent groundwood pulp. The balance is long-fibred chemical pulp which serves to hold the sheet of newsprint together. Groundwood manufacture will therefore be the principal operation at the first Southern newsprint plant now being erected at Lufkin, Texas. The making of groundwood pulp requires no chemicals. The process is merely a mechanical disintegration of the wood into fibres, the lignin and other wood constituents being present with the cellulose fibres.

The sulphite process, sometimes called the acid process, has not so far been used extensively in the South. The wood, after being converted into chips, is cooked in a solution of calcium bisulphite containing free sulphur dioxide. The cooking is performed in a large digester under pressure in a manner quite similar to that which will be described later. The first sulphite mill south of Virginia was erected in 1907 by the Champion Fibre Company at Canton, North Carolina, at which plant spruce, hemlock and hardwoods have been processed continuously. Pine can be and has been used, but this wood has been found to be more easily pulped by the alkaline processes. Recently, the Rainier Pulp & Paper Company has started the erection of a sulphite mill at Fernandina, Florida, for making rayon type pulps from Southern pine. Unofficial reports suggest that this operation will be a modified sulphite pulping procedure in which the resins of the pine are first extracted.

The two other chemical pulping processes which are used industrially are the soda and the sulphate processes. Both use an alkaline pulping solution, and in both the recovery of chemicals is very important for economic reasons. The older of the two is the soda process. It consists primarily in heating the wood in the form of chips in digesters with a solution of caustic soda. This process is used largely on short-fibred woods such as the hardwoods, gum, poplar, chestnut, oak, etc. The pulps produced are usually filler

(Continued on page 58)

The Champion Paper and Fibre Company plant at Houston, Texas, one of the South's new large pulp and paper mills

Improvements Near Completion at Republic's Alabama Plant

Stripper ingots inside the new ingot-mold yard and stripper building at Republic's Gadsden, Ala., plant

IMPROVEMENTS costing several million dollars are represented in the Republic Steel Corporation's Gadsden, Alabama, plant. Covering almost every department, they include two new open hearth furnaces, an ingot-mold yard and stripper building, installation of a bolt and nut factory, a new 2-story office building and extensions to the sheet mill that increase its capacity from 6,000 to 9,000 tons per month. Completion of the first wing of the new bolt and nut factory places Republic in the southern bolt-making field with a monthly capacity of 1,000 tons.

The two new open hearths are 150-ton units, increasing the total open hearth ingot capacity from 28,000 to 50,000 tons per month. The open hearth stock yard was enlarged and necessary changes in the open hearth high line approach were made. A new 7½-ton floor charging machine was installed; also a new 75-ton hot metal crane, over the charging floor.

Over-all extension of the open hearth building is 264 ft. The new ingot-mold yard and stripper building is 55 by 312 ft. The new bolt building, the first wing of which houses the forge shop, is designed to eventually cover 200,000 square feet. It is located next to the bar mill. Present bolt-making equipment includes eight cold-headers for making 3/16th to ½-inch stock up to 6 inches long, and eight hot-headers for making from 3/8th to 1½-inch bolts and rivets. In addition there is all the necessary hot and cold trimmers and cutters, two-hot-press nut machines and the necessary burring machines, a heat treating furnace, and complete threading and tapping equipment.

Additional slag car equipment and a new 210-ton crane was installed on the pit side of the open hearths. Considerable incidental rearrangement of railroad track had to be made throughout the yards in and around the open hearth and stripper building.

The open hearth ladles, with their stopper rigs for pouring two ingots at one time, have a capacity of 150 tons, the slag pot a capacity of 370 cubic feet. The stripper crane was moved from the soaking pit building to the new ingot mold building where ingot stripping is now being done. There is a new 15-ton crane in this building for light crane work such as the handling of hot tops.

Installation of new equipment and improvements in the sheet mill which increased sheet capacity 50 per cent, made available a complete line of sheet mill products including black, blue, and galvanized sheets. The hot mill train was extended with the installation of a new three-high roughing mill to replace one of the old two-high stands, and the installation of two new two-high finishing stands. Necessary feeder and catcher tables were added. The new hot mill motor drive is an 1,800-horsepower gear unit.

Two additional pack-heating furnaces were added to feed the new two-high mills. They are double-chamber type furnaces, each 55 feet long. At the last hot mill stand a return conveyor was built to take packs from this mill directly to the back of the furnaces for the final pass.

The four stands in the cold mill were moved to the east end of the box-annealing building and provided with an independent motor drive. A second pickling unit and a latest type galvanizing machine were installed, as well as a new scrubber and dryer. With the new equipment a complete line of highest quality galvanized products including corrugated, V-crimped, and rolled roofing and roofing trim materials is now available.

The sheet mill warehouse was extended 144 feet and six other mill buildings were enlarged. The improvement program entailed important additions to power lines, conveying and heating facilities, track layout, and so on. The new office building is a two-story fireproof structure, 42 by 122 feet.

An Enviable Record

Most business houses are justifiably proud of a 25-year record in business. But few can point to 25 years of uninterrupted operations for 24 hours a day, seven days a week, and 52 weeks a year, which is the remarkable record of the Forest Products Chemical Company of Memphis, Tennessee.

A letter from W. H. Matthews, President of the Company, states that production was started on July 1, 1914, and that during the period since then they have never had the fire out of their boilers or cessation of production—365 days a year for the full time. "At no time during this 25-year period has there been a postponed payroll nor an employee laid off because of curtailed operations."

The Forest Products Chemical Company regularly employs between 500 and 600 people.

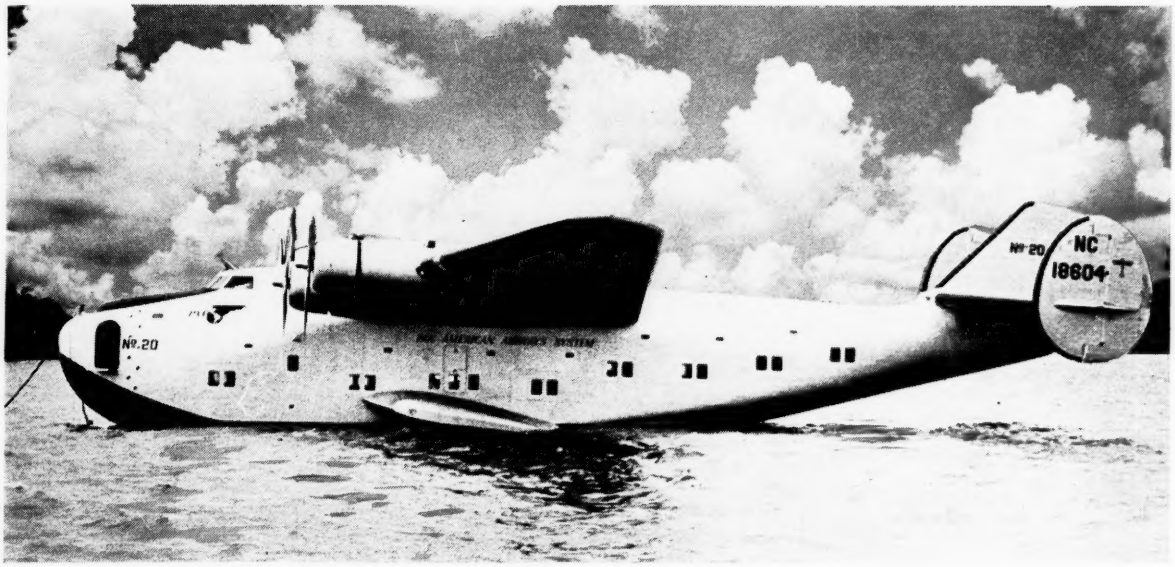
Gas Revenue Increases

Revenues of manufactured and natural gas utilities totalled $84,013,100 in January, an increase of 4.3 per cent from the figure of $80,559,400 reported for January 1938, it was announced today by Paul Ryan, Chief Statistician of the American Gas Association.

Revenues of the manufactured gas industry aggregated $33,734,200 for the month, an increase of 2.6 per cent. The natural gas utilities reported revenues of $50,278,900, or 5.5 per cent above January 1938.

Sales of manufactured gas reported for January amounted to 34,760,500,000 cubic feet, an increase of 3.1 per cent, while natural gas utility sales for the month were 129,397,500,000 cubic feet, an increase of 6.0 per cent.

Sales of natural gas for domestic purposes increased 5.7 per cent. The quantity of natural gas used for generating electric energy was 12.4 per cent above the previous year. Natural gas sales for other industrial purposes registered a gain of 3.6 per cent.



74 Passenger Clipper for Atlantic Service to Use Southern Terminal

TWO of six giant flying boats, the largest in the world, now have been delivered to Pan American Airways' Baltimore base for the transatlantic service which is expected to start within a few weeks. The first of these ships—the *Yankee Clipper*—arrived March 3 at the Maryland airport after a trip from the West Coast where it was built by Boeing Airplane Co. A sister ship, the NC 18604, shown in accompanying photo, it is hoped will bear the name *Baltimore Clipper*. The wingspread of these planes is 152 feet; overall length, 109 feet; height, 28½ feet; gross weight fully loaded, 82,500 pounds; and a fuel capacity of 4,200 gallons. The planes each have four 14-cylinder engines together developing 6,000 horsepower and provide a maximum speed of 190 miles per hour or a long distance cruising speed of 150 m.p.h.

Passengers will occupy the main, or lower deck of the plane which is approximately the level of the windows between the wings and pontoons. The passenger accommodation comprises: five main cabins for 10 daytime and 6 night time passengers; dining-lounge where 15 persons may be served at a time; one 4-person compartment; the "bridal suite"—a completely furnished apartment; separate men's and women's dressing rooms; and a galley where food for 85 people can be prepared. The upper, or flight deck accommodates from fore to aft the flight control, radio, navigation, and engineering stations, captain's office, hold, and crew's quarters. On short runs the planes can carry 74 passengers each, but for oceanic service the number will be limited to 40 in addition to the 10 crew members.

The time of starting regular service through the Atlantic skyways is still uncertain, although the *Yankee Clipper* has already departed on a route inspection flight to the French and British terminals. This, according to Pan American officials, is the last preparatory step that can be taken by the air line.

Then the project is up to the Civil Aeronautics Authority, which will determine whether the transatlantic route is a necessity in the interest of public convenience and if the facilities and huge aircraft just delivered are adequate for the service. When the Post Office Department decides that it will use the planes for trans-Atlantic mail, the Federal aeronautics regulators will set the rates to be paid for such service.

Pan American's terminal at Baltimore is in the new hangar built by the city especially to house great flying boats the size of the new ships. The structure is one of the most unusual of its kind. Due to the fact that the airport is filled ground and yet unfinished, the structure appears as a huge mushroom of steel with four steel columns carrying its entire weight to a stable foundation far below the river bottom.

Upon completion of the airport project, over-the-ocean travelers can transfer from the sea-flying boats to landplanes and continue journeys down the East Coast to Miami where other Pan American flying boats wing down through the Americas, or across the continent to the Pacific Coast, where flying clippers leave periodically for Asiatic destinations across the Pacific.

As an alternate base, Charleston, S. C., is making preparation to accommodate the planes in case the necessity should arise for an additional or temporary terminal further South than Baltimore.

Large Industrial Growth in Norfolk & Western Territory

Despite depressed business conditions in 1938, particularly during the first half of the year, a stable industrial growth in the territory served by the Norfolk and Western Railway is reflected in the annual report of T. Gilbert Wood, N. & W. industrial and agricultural agent.

Last year, according to the report, 158 new plants and additions, involving an outlay of $18,254,435 and employing 9,482 persons, were established in Norfolk and Western and tributary territory. This compares with 204 industries, 13,321 employees and capital investment of $22,486,100 for 1937.

Commenting on the industrial growth along the railway during the past year, the report said, "Manufacturers do not enlarge or expand except on the basis of reasonable profits, increased business or a prospective potential market, therefore, an analysis of this report leads us to consider the prospects for industrial development and expansion in Norfolk and Western Railway territory for 1939 as encouraging."

The plants and additions established by states in 1938 were: Virginia, 93; Ohio, 47; North Carolina, 13; and West Virginia, 5.

The number of industries established during the past eight years were given as follows: 1931, 145 plants; 1932, 180; 1933, 152; 1934, 168; 1935, 195; 1936, 196; 1937, 204; and 1938, 158, or a total of 1,398 industries and additions. More than $136,000,000 was invested in the plants, which gave employment to 76,422 persons.

South's Construction High

SOUTHERN construction showed a marked improvement during March. The $72,134,000 valuation placed on contracts reported in the daily issues of the CONSTRUCTION magazine is fifteen per cent ahead of the preceding month and an advance of thirty per cent over the total for the third month of 1938.

First quarter figures also indicated that construction in the sixteen States of the South is in a much better position than it was at the same time last year. The total for 1939 is $207,868,000, or almost twenty-eight per cent above the valuation of Southern contracts made in the first three months of 1938.

March total rises 30%— first quarter figure also up

Much of the increase this year is directly attributable to projects financed by Government funds. The $62,846,000 aggregate of school, housing and municipal, county, State and Federal buildings is up forty-four per cent. Government engineering projects such as dams, earthwork, sewers and waterworks, are also heavy contributors to the total, with private building, and roads, streets and bridges slightly above work of such character initiated in this period of last year.

In March, there was an encouraging industrial construction pick-up, which it is hoped presages greater activity in plant construction and expansion. The March industrial figure is thirty-six and sixty-two per cent, respectively, higher than the January and February totals.

Glenn L. Martin Company's $3,000,000 airplane plant expansion at Middle River, near Baltimore; Celanese Corporation's $10,000,000 plant at Pearisburg, Va., and Electro-Metallurgical Company's $5,000,000 plant near Sheffield, Ala., exemplify the most important industrial projects on which work has been started or is ready to begin.

A $5,000,000 newsprint manufacturing mill under construction at Lufkin, Texas, is forecast as the first of many of its kind to be established in the South. Concrete is now being poured for foundations of the buildings. Plants such as these require many hundreds of employes, with a resultant increased need for residential construction, additional stores, extended water works and sewers, new schools and sometimes improved streets.

The first announcement of the Lufkin mill was made over two years ago. Ground was broken in the early days of this year. Steps are being taken to provide for the influx of workers to be assembled when production is started next January. Local authorities are now making preparations to expand the town's educational facilities by erecting a $175,000 high school. Bids were opened for the building late in the month. Other structures are expected to follow.

Pascagoula, Miss., is another town experiencing a similar situation. Shipbuilding is the cause of its present growth. Ingalls Iron Works Co., of Birmingham, Ala., moved its shipbuilding activities from Mobile, across the Alabama-Mississippi boundary. Three shipways to accommodate vessels of 500-foot length and three gantry trackways are under construction at the Pascagoula site. The

Statistics of the South's Construction

	Contracts Awarded March, 1939	Contracts to be Awarded March, 1939	Contracts Awarded First Three Months 1939
PRIVATE CONSTRUCTION			
BUILDING			
Assembly (churches, theatres, auditoriums, fraternal)	$786,000	$3,036,000	$3,158,000
Commercial (stores, restaurants, filling stations, garages, etc.)	2,119,000	2,680,000	6,512,000
Residential (apartments, hotels, dwellings)	6,294,000	5,996,000	23,345,000
Office	1,297,000	2,310,000	10,382,000
	$10,496,000	$14,022,000	$43,397,000
INDUSTRIAL	$6,764,000	$8,193,000	$15,856,000
PUBLIC CONSTRUCTION			
BUILDING			
City, County, State, Federal	$15,159,000	$65,906,000	$31,391,000
Housing	2,487,000	10,837,000	4,082,000
Schools	7,481,000	8,886,000	27,373,000
	$25,127,000	$85,629,000	$62,846,000
ENGINEERING			
Dams, Drainage, Earthwork, Airports	$9,418,000	$26,307,000	$20,856,000
Federal, County and Municipal Electric	5,845,000	4,992,000	16,989,000
Sewers and Waterworks	4,005,000	4,063,000	8,838,000
	$19,268,000	$35,362,000	$46,683,000
ROADS, STREETS AND BRIDGES	$10,479,000	$29,277,000	$39,086,000
TOTAL	$72,134,000	$172,483,000	$207,868,000

city has found expansion of its water system desirable. Bids were opened last month for a large elevated tank and distribution system extensions. The Pascagoula harbor is to be improved. U. S. Engineers have opened bids for 1,100,000 cubic yards of dredging in the channel. Three of the Maritime Commission's merchant vessels are to be started when the Ingalls plant is completed by May 1.

More than $1,000,000 is being expended by another of the South's shipbuilding concerns—one of the country's most important. The Newport News Shipbuilding & Dry Dock Co., which is now building the country's giant of merchantmen, the America, is now making many improvements at its 165-acre Newport News, Va., plant. A $250,000 addition is being made to the main office building. A series of turret shops is also being erected; other units are to be replaced. The expenditure already made for new mold loft facilities is placed at $200,000. The National Biscuit Co., of New York, proposes a $2,000,000 bakery at Atlanta, Ga., for doubling its production to meet growing demands in the southeast. A 35-acre site in the Georgia metropolis has been acquired at a cost of $100,000 and construction is scheduled to begin within three months. The building, which will be arranged for straight-line production, will cost about $1,000,000. It will be one-story high and cover about seven acres. Its dimensions are about 900 by 300 feet.

Governmental power construction continued, with rural electrification, which is now greater than it has been since its start, supplemented in March by several important local electric plant projects. Jacksonville, Fla., the operator of a municipal electric plant long before the present wave of such construction started, let the contract for $450,000 worth of cable and other materials for use in extending the local transmission and distribution system. The South Carolina Public Service Authority prepared to advertise for bids on the second big dam under the $30,000,000 Santee-Cooper project. Low bids totaling $4,310,000 had already been received for the Pinopolis part of the plan. High Point, N. C., opened proposals for the dam, power house and equipment for its $6,492,000 system. Lower Colorado River Authority this month will receive bids for turbines, governors and generators for its Marshall Ford power plant, near Austin, Texas.

Representative Projects in South Last Month

Proposed

Ala., Birmingham—Jefferson County Commission; construct hospital and nurses' home; Charles H. McCauley, Archt. 2,000,000

D. C., Washington—Southern Railway; air condition railroad passenger coaches 800,000

D. C., Washington—Treasury Department; construct buildings for Social Security and Railroad Retirement boards 14,242,000

D. C., Washington — United States Army War Department building 27,000,000

Fla., Miami — Southern Hotel Co.; erect 100 room hotel 200,000

Fla., Panama City—Bay Line Railway; warehouse, docks 200,000

Georgia — W. Frank Upchurch and Associates; erect distillery 250,000

Ky., Owensboro — City; erect combined water and light plant 570,000

La., Shreveport — Commercial National Bank; erect 13-story office building; McKim, Mead & White, New York, Archts.; Samuel Wiener, Shreveport, Asso. Archt. 1,000,000

La., Shreveport—United Gas Pipeline Co.; erect 7-story office building 750,000

Md., Towson — Julien P. Friez & Sons; construct laboratory building; Glidden & Baldwin, Archts.; Whitman, Requardt & Smith and Fonda and Warfield, Engrs.; Paul G. Crout, Struc. Engr., all Baltimore 500,000

Mo., Kansas City — City; construct water works improvements; T. D. Samuel, Jr., Chief Engineer 200,000

N. C., Plymouth — North Carolina Pulp Co.; construct unit addition 800,000

Tex., Dallas—City, erect administration building, etc. at Love Field Airport 1,265,000

Tex., Houston—Del Ray Petroleum Co.; construct natural gasoline plant 250,000

Tex., Houston — Ripley Settlement Center; construct building; Birdsall P. Briscoe and Maurice Sullivan, Archts. 250,000

Tex., Natalia — Bexar-Medina-Atascosa Water Improvement District No. 1; construct concrete siphons, earth canal and irrigation system; W. M. Lilly, San Antonio, Engr. .. 315,000

Va., Alexandria — Don A. Loftus; erect number of small apartments 800,000

Va., Newport News—Newport News Shipbuilding & Dry Dock Co.; erect addition to main office building, mold lofts, shops 1,000,000

Contracts Awarded

Ala., University—University of Alabama; dormitory and dining hall; Martin & Lewis, Birmingham, Archts.; Daniel Construction Co., Birmingham, (low bidder) 240,000

Ark., Conway — Arkansas State Teachers College; girls' dormitory, common building, dining hall, heating plant and tunnels; Wittenberg & Delony, Little Rock, Archt.; William Peterson, Little Rock, Contr. 301,000

D. C., Washington — Bricklayers, Masons & Plasterers International Union of America; erect office building; Phillip M. Jullien, Archt.; George A. Fuller Co., Bldr. 500,000

D. C., Washington—Department of the Interior; construct superstructure of Thomas Jefferson Memorial; John McShain, Inc., Philadelphia, Pa., (low bidder) 2,157,000

D. C., Washington — District Commissioners; construct Ward Building No. 3 and central heating plant; Bahen & Wright, Inc., Contr. 807,000

D. C., Washington — District Commissioners; assembly hall gymnasium building at Margaret Murray Washington Vocational School for Girls; Skinker & Garrett, (low bidder) 264,000

D. C., Washington — District Commissioners; Juvenile Court Building, M. Shapiro & Son Co., Inc., New York, Contr. 462,000

D. C., Washington—Lafayette Building Corp.; erect 12-story building; A. R. Clas, Archt., Holabird & Root, Chicago, Ill., Asso. Archts.; owner builds 8,000,000

Fla., Panama City—Atlanta & Saint Andrews Bay Railway Co.; construct dock and warehouse; Doullut & Ewin, Inc., New Orleans, La., Contr. 200,000

Ga., Augusta—Auguste Amusements Co.; construct theatre; Roy A. Benjamin, Jacksonville, Archt; H. S. Baird, Inc., Jacksonville, Fla., (low bidder) 163,000

Ga., Milledgeville — State Hospital Authority; construction of buildings Nos. 4, 3 and 2; Central Contracting Co., Contr. 1,247,000
Plumbing, Heating, etc., Building No. 2; Seckinger Brothers Co., Atlanta, Contr. 136,000
Mechanical work, Building No. 3; Brittingham Heating and Plumbing Co., Augusta, (low bidder) ... 136,000
Robert and Co., Atlanta, Archts. and Engrs. for all buildings.

La., Carrville — Treasury Department; replacements and improvements at Carrville Marine Hospital; Raisler Engineering Co., New York City, Contr. 315,000

La., Lafayette — Louisiana State Board of Education; fine arts building and president's dwelling at Southwestern Louisiana Institute, Weiss, Dreyfous and Seiferth, New Orleans, Archt.; Caldwell Bros. & Hart, New Orleans, Contr. 326,000

La., Lake Charles—Gulf States Utilities Co.; construct addition; Stone & Webster, Consult. Engrs. 150,000

La., New Orleans—Housing Authority of New Orleans; 55 dwellings for Magnolia Street Housing Project; Moise H. Goldstein & Asso., New Orleans, Archts.; R. P. Farnsworth Co., (low bidder) 2,478,000

Md., Curtis Bay, Baltimore—Treasury Department; storehouse and shop buildings, U. S. Coast Guard Depot; Golder Construction Co., Philadelphia, Pa., Contr. 208,000

Miss., Vicksburg — Warren County Board of Supervisors; construct county courthouse; Havis & Havis, Vicksburg, Archts.; W. J. McGee & Son, Jackson, Contr. 269,000

Mo., St. Louis — Treasury Department; construction of post office garage building; J. S. Alberici, Contr. 640,000

N. C., Chapel Hill—University of North Carolina; construct dormitory, apartment building and Carolina Inn addition; George Watts Carr, Durham, Archts.; William Muirhead Construction Co., Durham, (low bidder) 265,000

N. C., Charlotte—Alson Court, Inc., construct 2-story apartment; A. Lloyd Goode Construction Co., Contr. 250,000

N. C., Charlotte—City, J. B. Marshall, City Mgr.; construct hospital building and nurses' home for Charlotte Memorial Hospital; Walter W. Hook, Archt.; J. J. McDevitt, Co., Contr. 588,000

N. C., High Point—City; hydro electric plant dam, powerhouse and spillway; Murray & Flood, Inc., New York, Engrs.; Maxon Construction Co., Dayton, Ohio; (low bidder) 1,674,000

N. C., Statesville—City; sewage disposal plant; V. B. Higgins Co., Greensboro, Contr. 232,000

South Carolina—South Carolina Public Service Authority; construct dams, locks and power plant at Pinopolis; Harza Engineering Co., Charleston, Engrs.; west dam, locks and power plant; Central Engineering Co., Davenport, Iowa (low bidder) 4,172,000

S. C., Greenville—City; furnishing and installing pipeline through mountains from Table Rock to Greenville; J. E. Sirrine & Co., Engrs.; Hardaway Contracting Co., Columbus, Ga. (low bidder) .. 773,000

S. C., Greenville — Greenville City Water Works Commission; furnishing pipe and fittings, J. E. Sirrine & Co., Engrs.; cast iron pipe; American Cast Iron Pipe Co., Contr. 579,000
Installing pipe, etc.; Blythe Bros. Co., Charlotte, N. C., Contr. 272,000

S. C., Lancaster—Board of Directors, Marion Sims Memorial Hospital; Hospital and nurses' home; James Gamble Rogers, New York City, Archt.; V. P. Loftis, Charlotte, N. C., Contr. 210,000

Tenn., Chattanooga — Apartment building; L. H. Bull, Archt.; L. A. Jones Co., Chattanooga, Contr. 500,000

Tenn., Dyersburg — City; construct high school building; Hart & Russell, Nashville, Archt.; Young & Maury Construction Co., Memphis, Contr. 224,000

Tex., Houston—Sisters of Charity of the Incarnate Word; construction of convent building; I. E. Loveless, Beverly Hills, Calif., Archt.; Southwestern Construction Co., Contr. 250,000

Tex., Nacogdoches — Nacogdoches Independent School District; high school, junior high school and negro school; Hal B. Tucker, Archt.; Hal C. Dyer, Dallas, Contr. 287,000

Tex., Raymondville—Willacy County Water Control and Improvement District; lining canals; Cement Gun Co., Allentown, Pa., Contr. ... 1,077,000

Iron, Steel and Metal Market

STEEL production was at the rate of 56.1 per cent of capacity for the last week in March, which is slightly above the rate of recent weeks and nearly 20 per cent above the rate of production of the same week a year ago.

Hesitancy is still apparent on the part of buyers, although improvement in orders is anticipated for the current quarter as indicated in this place last month. Rail buying and requirements of the automobile industry, as well as increased business from other quarters are likely to add to the operating rate. The automobile industry anticipates domestic deliveries in March will aggregate 335,000 units, which is over 50 per cent above the total reached in February, and almost that percentage above the record of March, 1938. This is said to be the first month since August, 1937, that sales have gone above 300,000, and while less than the seasonal gain in normal times, it indicates a large demand for steel products. The program outlined by the U. S. Maritime Commission is likely to be an important factor in the business of steel mills.

U. S. Steel Report

In the annual report of the Chairman of the U. S. Steel Corporation, optimism over the outlook for the future was expressed. While the preceding year "was one involving difficult and uncertain business problems" and "at no time * * * did the demand for iron and steel products attain proportions commensurate with satisfactory and profitable operations," yet the improvement in the first two months of 1939 was taken as a gratifying tendency.

The report was interesting from a number of standpoints. Inventory stock are not excessive. During the month of December employment by the U. S. Steel Corporation reached a total of 207,370.

Under the group plan, 193,288 employes were insured for $397,650,000. Space will not permit further details of the interesting human side of the operations of this great producer, although the report teems with references that deal with such important matters as insuring the safety of workers, major accidents showing a reduction of 23.4 per cent; also the proprietary interest which 38,000 employes, owning 634,400 shares of common stock, have in the business of their employer.

Rate Injunction Granted

The seven steel companies which complained about the wage rate set by the Labor Department under the Walsh-Healey act, have been granted a temporary injunction in the United States Court of Appeals. They contended that the Secretary of Labor exceeded her authority in deciding on a basic minimum rate of 62½ cents an hour must be paid by steel firms when filling government contracts. The claim was placed before the Court that the action was arbitrary and would destroy small independent operators; also that 40 steel producers, employing 25,000 men, were affected. Hearings on the case are to be held early this month.

The Association of Iron and Steel Engineers had their annual Spring conference at Birmingham the last week of March. Technical phases of the steel industry were discussed in papers presented at the opening session. Robert Gregg, president of the Tennessee Coal, Iron & Railroad Co., was the principal speaker at the annual banquet.

New Steel Orders

The Bethlehem Steel Corporation has received orders for 7500 tons of shapes for the Delaware aqueduct, besides 3,000 tons of structural steel for a Pratt & Whitney building at Hartford, Conn., and 3,000 tons of reinforcing steel for the Grand Coulee dam.

The American Bridge Company has booked an order for 15 barges for the Mississippi Valley Barge Line Co., which will take nearly 6,000 tons of plates. Carnegie-Illinois Steel Corporation has received orders for 1,350 tons for the substructure of a bridge at Jamestown, R. I., and 1,000 tons of sheet piling for a Milwaukee bridge.

New York City will receive bids for 4,000 tons of reinforcing steel for the East River drive and another 1,500 tons of reinforcing steel for the approach to the George Washington bridge. Probably as much as 9,000 tons of plates, besides more than 4,000 tons of other steels are anticipated as being necessary for the airplane carrier to be built by the Newport News Shipbuilding and Dry Dock Co.

Kansas City is inquiring for 3,000 tons of shapes for a viaduct; Harrisburg, Pa., 2,000 tons for an office building, and Cleveland, Ohio, 1,850 tons for a bridge.

Prices of scrap hold firm. The situation in other countries is responsible for the favorable sentiment and there were indications that foreign buyers might decide that rates of $13.00 to $13.50 were interesting.

Export copper was quoted at 10.30 cents a pound the end of the month, while the domestic market was firm at 11.25 cents a pound. Japan came into the market as a buyer and domestic firms expressed encouragement over the firmness of the price.

Wages and Production

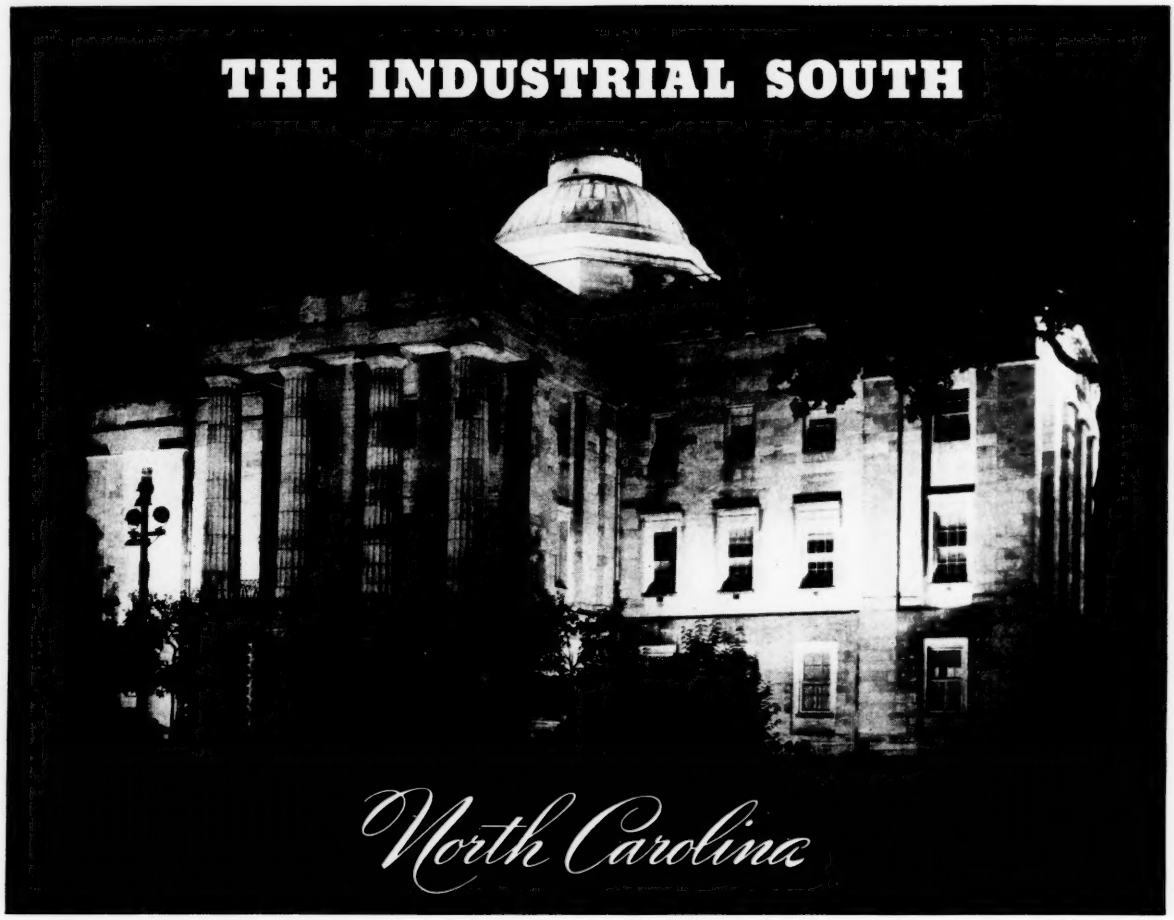
"Steel Facts" reports that wage-earning employees in the steel industry in 1938 received more wages per ton of products produced than in any of the preceding four years. Productivity per man-hour of work, however, was somewhat lower than in any year of that period except 1934. During last year, for every ton of steel and pig iron produced, the industry paid to its manufacturing employees an average of $18.40, exclusive of all salaries or payrolls of mining or transportation subsidiaries.

Direct wages paid per ton averaged 6 per cent above the 1937 average, and 28 per cent above 1936.

Production per man-hour of work averaged about 102 pounds in 1938, which was a decline of about 5 per cent from 1937.

The industry's annual capacity was raised by nearly 1,500,000 tons during 1938 by expansion and modernization programs. Most of the increase in steelmaking capacity was for producing open-hearth steel ingots.

Capacity for producing steel in electric furnaces increased about 210,000 tons a year during 1938 and reached a total of 1,540,000 gross tons.



Where textiles are king

NORTH CAROLINA played a leading role in the early development of the South's cotton textile industry and today ranks as the number one state in textile manufacture. The South, led by North Carolina, now manufactures 86 per cent of the country's cotton textiles, 70 per cent of the rayon, and also has a rapidly expanding knitting industry.

Bethlehem Steel Company has actively participated in the industrial development of the South, both through the upbuilding of its Maryland Plant at Sparrows Point, Md., and through the wide range of steel products that it furnishes to Southern industry. Among them are pipe, wire products, concrete reinforcing bars and a variety of flat rolled steel products made at the Maryland Plant and supplied to the entire range of the South's rapidly growing industries.

Did you know?

That gold was discovered in 1802 in Cabarrus County, in a rock used in a doorstep, and that until 1849 North Carolina was the country's leading gold-producing state.

That North Carolina has more than twice enough water power to manufacture all the cotton of the South.

That in 1729 seven of the original eight Land Proprietors of the colony of North Carolina sold to the Crown all but a seventy-mile-wide strip of the state bordering on Virginia for $87,500. Estimated value of property in North Carolina today is $3,431,000,000.

That North Carolina each year manufactures enough cigarettes to pave a four-lane highway from Raleigh to San Francisco.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

New Ways of Doing Things

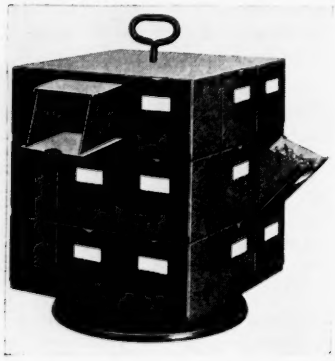
Floor Patching Material

With the addition of Montmorillonite to increase coverage capacity per pound, Ruggedwear Resurfacer, a popular floor repair material manufactured by Flexrock Company of Philadelphia, Pa., has undergone its second major improvement within a period of five years. The first improvement was the adoption of the cellulose process, exclusively Flexrock's, which made the product one of the toughest, as well as simplifying the production process, resulting in a low price to the consumer. Montmorillonite is chemically composed of manganese, silica, alumina and iron. It produces an easier mixture with cement, sand and stone, thus decreasing labor costs, while increasing the toughness of the product and making it particularly suitable for "feather edge" concrete repairs. When used as a ½-inch topping over concrete, Ruggedwear Resurfacer stands up well, it is claimed, under severe industrial conditions.

Laying Ruggedwear Patch

For Storing Small Parts

The Noggle Products Company, Ann Arbor, Mich., has introduced the Spin-A-Bin, a revolving assembly of welded steel bins, all in a compact unit, for the industrial plant, store, etc., to hold screws, bolts, contact points, fuses and other small parts neatly stored. The Spin-A-Bin is available in a unit of 24 bins each 3 by 3 by 2½ inches, or 24 bins each 4 by 4 by 3 inches. Bins are of 26-gauge steel, spot welded and finished in green, and in either model a double width bin may be substituted for any pair of single width bins. Referred to as a "merchandise mover on the sales counter," the unit may be equipped with labels on the front of each compartment, designating its contents, or a specimen of the product it holds may be wired to the front of the compartment.



Revolving Assembly for Holding Small Parts

Rotary File Ground from the Solid

Grobet Files from the Solid

The Grobet File Corp. of America, 3 Park Place, New York, whose files have been a standard of excellence throughout the world for more than one hundred years, recently added to its regular line of Hand Cut Rotary Files and Milled Cut Rotary Files, a complete line of Rotary Files ground from the solid after hardening and made of super high speed steel. An outstanding advantage of these files is that they may be resharpened at any time at a very low cost. They are illustrated and described in the company's catalog "G 56," which, incidentally, is one of the most complete catalogs of its kind.

Colormix-Kurokrome Concrete Floors

In a folder recently issued by The Master Builders Company of Cleveland, Ohio, the new Colormix-Kurokrome method of installing and finishing colored concrete is treated in detail. By means of a simple technique, the Colormix method overcomes two difficulties that have heretofore handicapped colored floor construction—workmanship and construction. While first class workmanship is desirable, with the Colormix-Kurokrome method satisfactory results are obtained, it is declared, where only average workmanship is available.

Produced as a fine dry powder of intense drying power, Colormix produces deep, stable shades with a minimum quantity of inert oxides. In addition, it contains Master Builders Omicron, unique water-reducing agent, which is said to eliminate 30 per cent of excess water used in ordinary floor construction. The Kurokrome Process embodies a penetrating surface sealer, colored to match the Colormix, which is brushed over the fresh floor to provide an airtight seal; check salts or efflorescence to mar color; dye out any imperfections or non-uniformity; prevent absorption of stains, and provide a smooth, non-slip floor surface.

The company is also distributing a folder outlining the Glazecoat Method of coloring concrete floors already laid. This method embodies a new technique, resulting from late developments in the field of synthetic resins and is distinguished from conventional paint-coating by durability; applicability to surfaces where ordinary painting is not satisfactory or serviceable, and the method of applying which involves less time and inconvenience.

Elevated tank built by Chicago Bridge & Iron Company, Chicago, Ill., for the State Building Commission, Bi-Partisan Advisory Board, Jefferson City, Mo., for use at one of the State Prisons

Cutler-Hammer Managers Appointed in South

A new district office has been established at New Orleans, La., by Cutler-Hammer, Inc., Milwaukee, Wis., electrical control apparatus manufacturer. The company has opened a new district office at 539 Gravier St., New Orleans, La., in charge of Joseph Gardberg, Georgia Tech graduate. The new manager of the Dallas, Texas office is W. E. Ragsdale.

Papermaking in the South—A Brief History

(*Continued from page 35*)

suspended publication in many instances while others curtailed their schedule and at least one, *The Daily Citizen* of Vicksburg, Miss., eked out an occasional and precarious existence on wall paper. Correspondence was limited to necessities and many letters were written on the reverse side of labels, etc., for the only good paper was that from Europe which managed to evade the Northern blockade. Every encouragement was given to those who would attempt the manufacture of paper and several such were made, but the lack of proper equipment, materials, and capable help resulted in very little being accomplished and that little was generally exceedingly crude. The shortage of rags was keenly felt also and consequently the variety of substitute materials tried could hardly have been exceeded by the European experiments then at work.

In 1864 there were 835 mills in the entire country according to the manuscript

(*Continued on page 54*)

from Here *to* Ear

THE SHORTEST DISTANCE IS LONG DISTANCE

You have a message. You want an ear. It's miles away, with millions of other ears in between. But Long Distance will deliver your message quickly right to the ear you want to reach—and bring back an answer.

When you want *personal* news from far-away relatives and friends . . . when you need *immediate* information on business problems . . . turn to your telephone. It's *direct*. It's *fast*. It's *inexpensive*. Look in the front of your telephone directory and see how *low* the rates really are. Then name the number and the EAR is HERE!

BELL SYSTEM — AMERICAN TELEPHONE & TELEGRAPH CO. AND ASSOCIATED COMPANIES

Wood, An Important Cellulose Crop*

BY

E. O. Siecke,

Director, Texas Forest Service

TEXAS contains a larger area covered with forest growth than any other state. Of the 167,935,000 acres comprising the land area of Texas, approximately 35,000,000 acres or approximately one-fifth of the total area of the state is covered with forest growth. This area is over 10,000,000 acres larger than the forested area of any other state in the Union.

Of the forested area in Texas about 22 million acres are classed as protection forests or a combination of protection and low yield commercial forest. The remaining 12½ million acres constitutes the East Texas pine and hardwood belt or the chief commercial forest area of the State.

The stand of timber of commercially valuable species in East Texas is estimated at about 25 billion board feet in trees 12 inches and above in diameter. If trees from 9 inches to 12 inches in diameter are included the total volume will exceed 30 billion board feet. Prior to the depression the lumber production alone averaged 1,500,000,000 board feet annually, exclusive of the vast amount of material taken for poles, cross-ties, piling, cooperage, etc. When economic conditions again become normal our forest growing stock in East Texas will easily support an annual lumber production to the extent of 1½ billion board feet, together with the usual amount of other forest products. With improved forestry practices, the annual production can be materially increased. Proper forest management will also provide ample pulpwood for a greatly expanded wood pulp and paper industry without materially reducing the quantity of larger sized trees suitable for sawlogs and poles.

The forests of Texas contain at least 200 million cords of wood constituting approximately 335 million tons of wood fiber calculated on the basis of dry weight. Common uses of wood prevalent up to this time such as the manufacture into lumber, poles, piling, cross-ties and posts have utilized species representing only about 35 per cent of the total amount of wood fiber existing in Texas today. The remaining 65 per cent, amounting to 215 million tons of wood fiber are in species of low present commercial value or are found in species classed as weed trees.

What is this wood fiber? For the purpose of this discussion it is sufficient to appreciate that wood fiber consists of from 45 to 58 per cent cellulose and about 25 per cent lignin. Therefore, the 335 million tons of wood fiber in Texas, calculated on the conservative basis of 50 per cent cellulose, contain the enormous quantity of 167 million tons of cellulose. It is difficult to visualize the vastness of this supply. Cotton lint is practically pure cellulose. The average annual cotton production in Texas prior to regulated agriculture amounted to about 4 million bales or 1 million tons of cotton lint. Therefore, 167 years would be required to produce, on the basis of 4 million bales of cotton annually, an amount of cellulose equal to the amount now stored in existing forests of Texas.

The annual increase in wood fiber in the species of inferior commercial value and so-called weed trees, even after deducting present utilization for fence post and fuel, produces annually an amount of cellulose equal to that which may be processed from 8 to 10 million bales of cotton. Furthermore, the periodic thinnings in growing commercial forests of the more valuable species should make available cellulose at the rate of 450 to 500 pounds per acre per year. Such periodic and auxiliary harvesting or thinning constitutes good forestry practice to insure the maximum development of the final crop of large trees.

Of what interest is this to the farmer? Of the total area of 35 million acres covered with some sort of timber growth in Texas only about 5 million acres are held in large ownerships. It follows therefore, that the bulk of the existing wood fiber in Texas today and a large percent of the annual growth of wood fiber occurs on land owned primarily by farmers and ranchers. The small land owners, in the aggregate, have far more to gain than do the owners of large units of timberland if and when chemurgy makes it possible for these millions of columns of wood fiber to be fed to industry with fair and equitable profit to both owner and manufacturer. Certainly, this situation presents a challenge to experts in the field of applied chemistry.

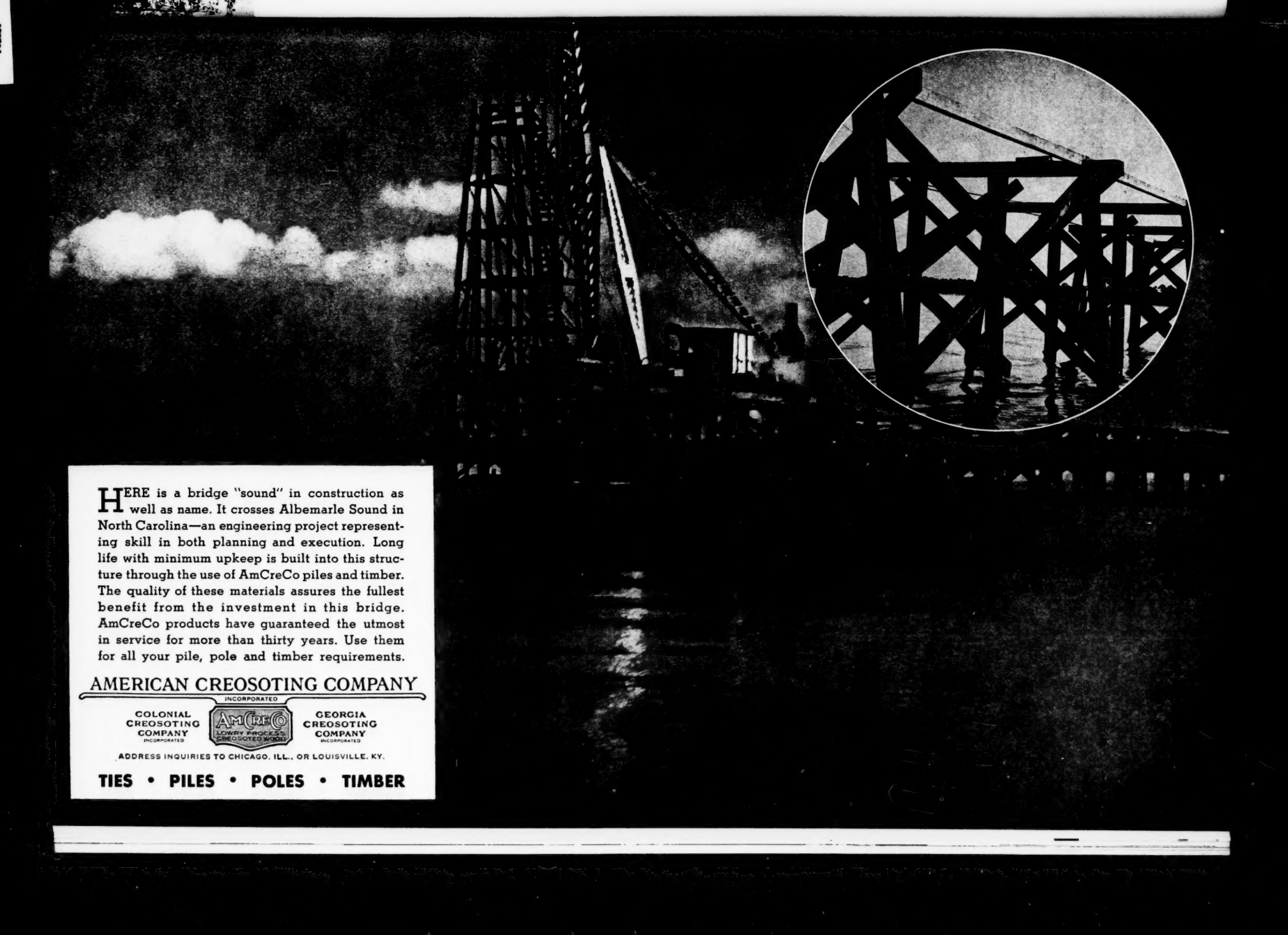
In Texas, according to present indications, development in the use of cellulose derived from wood fiber will come about first through use in the manufacture of paper including newsprint with the three native Southern pines comprising the principal species used. However, a limited amount of gum is also used. At the present time tests are being conducted in Texas to determine the advisability of using pulp from various species of oak for mixing with pine and gum pulp. Additional uses will of course depend upon research to devise successful methods of obtaining usable cellulose from additional tree species and further development in

(*Continued on page* 64)

Left—Ten cords per acre of pulpwood were thinned from this stand of loblolly pine in East Texas leaving a good stand for timber use.

Center—Slash pine planted in 1926 *by Texas Forest Service now average* 41.5 *ft. high and* 6.3 *ins. D.B.H. The stand measures* 16.6 *cords per acre. Right—Stand of* 70*-year-old shortleaf pine on State Forest No.* 3, *after being cut to a* 14 *inch diameter limit*

*A paper delivered at the Gulf Coast Chemurgic Conference, Beaumont, February 10, 1939.



HERE is a bridge "sound" in construction as well as name. It crosses Albemarle Sound in North Carolina—an engineering project representing skill in both planning and execution. Long life with minimum upkeep is built into this structure through the use of AmCreCo piles and timber. The quality of these materials assures the fullest benefit from the investment in this bridge. AmCreCo products have guaranteed the utmost in service for more than thirty years. Use them for all your pile, pole and timber requirements.

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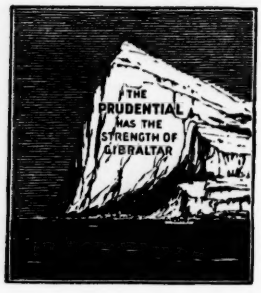

THE PRUDENTIAL
INSURANCE COMPANY OF AMERICA
HOME OFFICE: NEWARK, N. J.

» » » *Finance* « « «
AND KINDRED SUBJECTS

Changes Requested in S.E.C. Rules

Representatives of national security exchanges, at a meeting held in Washington, decided on a program for submission to the Securities and Exchange Commission, which asked for revisions and modifications of present regulatory rules.

The opinion of these representatives of the exchanges was: regulations are too complex; that there is duplication of regulations which burden those issuing securities and those who underwrite them with unnecessary expense and effort. As a result, it is believed that many corporations whose securities would ordinarily be listed refrain from applying because of restrictions upon directors and large stockholders. Further, the belief was expressed that it is to the public interest to develop the scope and effectiveness of the national securities exchanges.

Reduced Inventories

The National Industrial Conference Board reports marked improvement in the inventory situation of American industry during the past year. The declines in manufacturers' stocks of raw materials, semi-finished and finished goods during the past six months are believed to have gone a long way to correct the over-expansion of inventories occurring late in 1936 and throughout 1937, regarded as a major cause of recent recession.

Findings are based on holdings of 80 individual commodities and cover a representative sample of approximately one-fifth of all such inventories.

Equipment Expenditures by Railroads

Capital expenditures for equipment and other improvements to railway property made by Class I railroads in 1938 totaled $226,937,000, according to the Association of American Railroads. This was a decrease of $282,856,000 below similar expenditures in 1937, and in comparison with the expenditures for 1930 the decrease was $645,671,000, showing the extent to which capital expenditures have been curtailed.

Centralized Bank Control

If the proposed government reorganization legislation is enacted, it is considered quite probable that consolidation or reorganization of banking agencies, including a shift of duties and personnel in the Federal Reserve Board and Federal Deposit Insurance Corporation, will be made.

Chairman Eccles of the Federal Reserve Board proposes that the office of the Comptroller of the Currency, which is now in the Treasury Department, be abolished and that existing bank examination and supervisory functions of the Comptroller be centered in the F.D.I.C., with the added responsibility of bank regulation now exercised by the Federal Reserve Board. The result would be to centralize government bank regulation in the hands of the one agency that now guarantees deposits, which in addition, with its bank examination duties, would have absolute control over the credit policies of insured banks. It is Mr. Eccles idea to use the credit control power by relaxing examination standards in periods of sub-normal demand for credit, and tightening them in boom periods.

In the meantime, loans and discounts of all commercial banks insured under the F.D.I.C. increased 2 per cent during the second half of last year compared with the first six months, although still 4 per cent under the comparable period of 1937.

Total deposits increased about 5 per cent last year to nearly $50,000,000,000, the highest figure since deposit insurance was started.

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Chairman of the Board

51 Madison Avenue, New York, N. Y.

ALFRED L. AIKEN
President

A BRIEF DIGEST OF THE

94th Annual Statement

DECEMBER 31, 1938

Payments to policyholders and their beneficiaries during the year 1938 amounted to $201,494,937. Of this total, $131,804,103 was paid to living policyholders and $69,690,834 to beneficiaries.

Total payments to policyholders and beneficiaries during the past ten years exceeded $2,147,000,000.

New insurance during the year amounted to $422,817,500. Total insurance in force at the close of 1938 was $6,793,826,309 under 2,828,765 policies.

The Assets on December 31, 1938 amounted to $2,647,454,712. The principal item of the Liabilities was the Insurance and Annuity Reserve required by law, amounting to $2,159,527,400. Also included in the Liabilities are a reserve of $41,569,539 for dividends to policyholders in 1939 and a Special Investment Reserve of $45,000,000. Surplus funds reserved for general contingencies amounted to $124,555,211.

ASSETS

Cash on Hand, or in Bank	$50,466,059.12
United States Government, direct, or fully guaranteed Bonds	626,759,519.45
State, County and Municipal Bonds	252,459,640.75
Canadian Bonds	64,567,067.95
Railroad, Public Utility, Industrial and other Bonds	583,416,306.92
Preferred and Guaranteed Stocks	87,745,048.00
Real Estate Owned, Including Home Office	135,450,673.37
First Mortgage Loans on Real Estate (Including $698,364.35 foreclosed liens subject to redemption)	436,091,057.66
Policy Loans	349,262,979.85
Interest and Rents due and accrued	29,880,864.05
Net Amount of Uncollected and Deferred Premiums	31,335,538.18
Other Assets	19,956.31
TOTAL	$2,647,454,711.61

LIABILITIES

Insurance and Annuity Reserve	$2,159,527,400.00
Present Value of Amounts not yet due on Supplementary Contracts	127,972,335.45
Dividends Left with the Company at Interest	113,087,924.11
Other Policy Liabilities	15,761,712.71
Premiums, Interest and Rents Prepaid	11,529,650.32
Miscellaneous Liabilities	3,572,265.52
Special Investment Reserve	45,000,000.00
Reserve for Taxes	4,878,673.66
Reserve for Dividends payable to Policyholders in 1939	41,569,539.00
Surplus funds reserved for general contingencies	124,555,210.84
TOTAL	$2,647,454,711.61

Securities valued at $38,738,698.21 in the above statement are deposited as required by law.

A more complete report listing the securities owned by the Company will gladly be sent upon request.

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A PIONEER IN SOUTHERN PROGRESS

Points the Way

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The Jefferson Standard is the South's largest Ordinary Life Insurance Company. It was built by Southerners. Ninety per cent of its assets are invested in the South. In thirty years Jefferson Standard has risen from last in the Nation to a prominent, respected position among major life insurance companies—with assets in excess of $80,000,000.

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If you are interested in the South's Future — Read this inspiring booklet . .

A PATTERN FOR SOUTHERN PROGRESS

Now in its fifth printing, illustrated with fourteen charts, endorsed by scores of Southern leaders.

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JEFFERSON STANDARD
LIFE INSURANCE COMPANY

Julian Price, *President* **GREENSBORO, N. C.**

"Finance and Kindred Subjects"

(*Continued from page* 54)

Seaboard Earnings

Total operating revenues of the Seaboard Air Line Railway for February 1939, were 6.92 per cent over February 1938. Freight revenue increased 5.69 per cent and passenger revenue 19.08 per cent. This was the greatest passenger revenue for any month since February 1930.

"Emergencies" Continue

It is probable that the $2,000,000,000 stabilization fund to peg the gold price, and executive power to further devalue currency, as well as the $3,000,000,000 greenback authority, all specified as emergency monetary powers when enacted, will be continued when they expire the end of this June, although renewal of the latter, known as the Thomas Greenback Amendment, is least likely, in the possibility that it may be sacrificed by administration forces in order to continue the other two.

Under the TVA

Southern cities interested in obtaining TVA power may be warned by the experience of Nashville, Tenn., where during an effort by the TVA to purchase utility properties of the Tennessee Electric Power Co., a Commonwealth & Southern subsidiary, it was finally found there is no authority in the TVA enabling act to acquire or transfer the very property it was offering the city.

Meanwhile, the Congressional investigation of the TVA, which was suspended the latter part of last year, has been stopped by administration leaders. The action effectively shuts off efforts to probe a special audit of TVA accounts which had not been completed at the year-end recess.

Railroad Carloadings Up

Rail aid legislation continues to be proposed in Washington. One of the latest suggestions is included in the Chandler Bill which would afford relief to a group of railroads needing to make adjustments in capital structure, but not so insolvent as to require overhauling under the Bankruptcy Act. The method involves a moratorium with creditors and security holders "without impairing the normal operations, employe relations and the permanent stability of the railroads."

Meanwhile, carloadings in the week of March 25 reached a new high for 1939, totalling 605,462 cars. Heaviest gains were registered in loadings of miscellaneous freight.

Federal Relief

As a compromise between the economy bloc in Congress and administration demands for an additional appropriation of $150,000,000 for relief to supplement the $725,000,000 previously granted, $100,000,000 has been made available to the WPA until the end of June. While apparently a partial victory for economy forces, it has been pointed out by some observers that in reality this gives the WPA more money than originally asked when the $875,000,000 appropriation was requested. It was not known then that there would be a $69,000,000 unexpended balance from the previous grant which, with the last appropriation, gives the administration $19,000,000 more than originally expected.

The National Industrial Conference Board issued figures last month showing the distribution of Federal relief in 1938. Per capita expenditures paid to states and individuals ranged between a high of $101 in Nevada, and a low of $13 in three Southern states. Payments of less than $20 per capita were made in sixteen states, mainly in the South but including Maine, New Jersey and Connecticut. Payments of $20 to $30 per capita were made in eighteen states, and $30 to $50 payments were made in six states scattered in the Pacific, Rocky Mountain and Middle West sections.

Kerlow Steel Floors

Better Floors for Safety

Kerlow industrial floors are safer and give better ventilation—made in various types 70% to 90% open—made in all riveted and rectangular designs for personal choice. Kerlow "BOLDEJ" Safety Steps are made in all grating designs. Ask for catalog.

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2. *Non-slipping*
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5. *Custom-Made to Fit*

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New Orleans, La. — Louisville, Ky.

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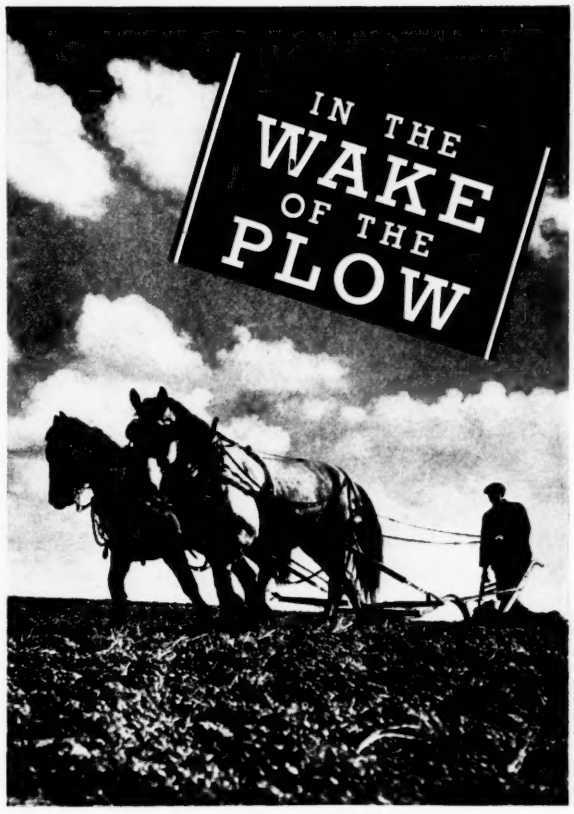

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PRECISION TRANSPORTATION

INDUSTRIAL NEWS

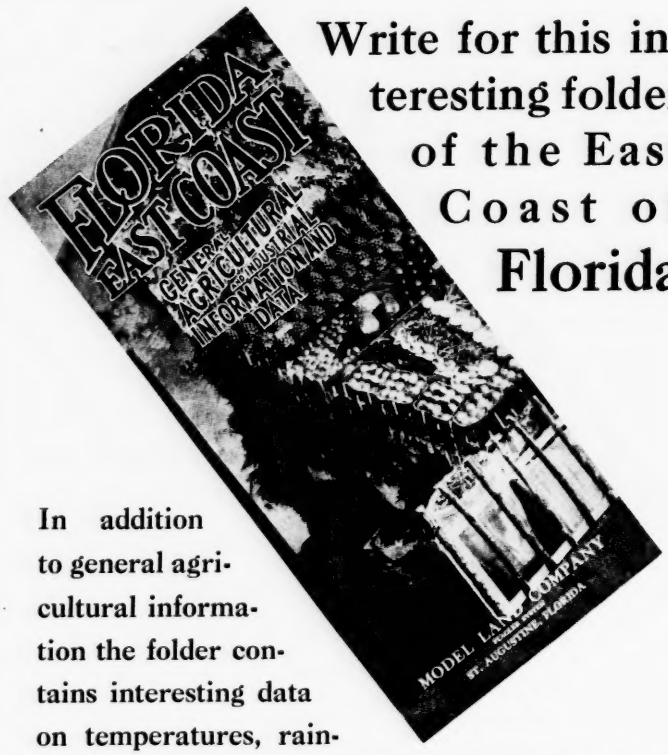
Locomotive Company Reorganizes

Under a plan by which the H. K. Porter Company of Pittsburgh, Pa., has been taken over by its bondholders, a reorganization has been effected by which this old industrial locomotive manufacturing firm emerges debt-free and with a net working capital of more than $250,000. T. M. Evans, formerly with the Gulf Oil Corporation, has been elected president. New directors include H. C. Bughman, Jr., president of Union Springs and Manufacturing Company; Q. S. Snyder, vice president of Blaw-Knox Company; Christian Z. Schove, attorney; H. R. Donnaly, president of Iron & Glass Dollar Savings Bank, and Mr. Evans. The company's plant occupies a plot of more than 4 acres of land and manufactures a complete line of industrial locomotives, including Diesel-Electrics, Gasoline, Gasoline-Electric, Steam, Fireless-Steam, and Compressed Air locomotives.

Will Standardize Precast Concrete Building Units

With the announcement of the organization of the Cementstone Corporation of Pittsburgh, Pa., for the purpose of effecting a nation-wide standardization of prefabricated concrete units, produced by newly patented principles of manufacture, there comes the further announcement that the company's units are so coordinated with standard steel construction elements that the structure of a fireproof building may now be built of prefabricated concrete and structural steel, and that costly poured forms will not be necessary. The D. J. Kennedy Company of Pittsburgh is the corporation's first licensee for the manufacture of Cementstone products and it has gone into steady production.

W. P. Witherow, founder of the Witherow Steel Corporation and president of Blaw-Knox Company, is chairman of the Cementstone board; Leslie M. Johnston, former vice president and general manager of A. M. Byers Company, is president, and Albert Henderson, who developed the system, is consulting engineer. The corporation will manufacture precast concrete products and will supply its patented equipment to licensees in designated areas throughout the United States. These licensees will be granted exclusive rights to manufacture under the corporation's patents and its trademark "Cementstone."



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TRADE LITERATURE

FOR STEAM OR HOT WATER LINES—
Bulletin No. 35-70B—in two colors, devoted to ADSCO pipe supports, saddle plates, pipe alignment guides, and pipe anchors for steam or hot water lines.
American District Steam Company, North Tonawanda, N. Y., manufacturers of expansion joints and other steam distribution equipment.

VACUUM CLEANING IN INDUSTRY—
Bulletin No. 120—"Vacuum Cleaning A New Tool For Industry," pointing out how vacuum cleaning brings new economies and conveniences to industry and outlining features of the Spencer system.
The Spencer Turbine Company, Hartford, Conn.

PUMP DATA—
Engineering Handbook—256 pages, for engineers and pump users; 148 pages engineering data and 108 pages of pump listings; subjects discussed include: Effect of changing speed on capacity; operation of pumps in series; operations of pumps in parallel; how to figure pump horsepowers, etc.
Economy Pumps, Inc., Hamilton, Ohio.

BOILERS—
Catalog—devoted to bent-tube boilers, covering two-, three- and four-drum types, together with necessary setting arrangements, as well as various special designs of units for capacities ranging from 100,000 to 1,000,000 pounds of steam per hour, particular attention being given the three-drum design; twenty-five different setting drawings included, as well as illustrations of furnaces, boiler details, construction views and manufacturing operations.
Combustion Engineering Company, Inc., New York, N. Y.

BEARING BRONZE—
Catalogue 390—devoted to Johnson Quality Bearing Bronze, including bronze bearings, bronze bushings, Johnson Universal Bronze Bars, electric motor bearings, Johnson babbitt, and graphited bronze bearings; also includes comprehensive price list.
Johnson Bronze Company, New Castle, Pa.

CHENEY FLASHING—
Booklet—devoted to Cheney flashing, including the Three-Way 10-oz. Flashing and the Cheney System of Spandrel Waterproofing.
Revere Copper and Brass Incorporated, 230 Park Avenue, New York.

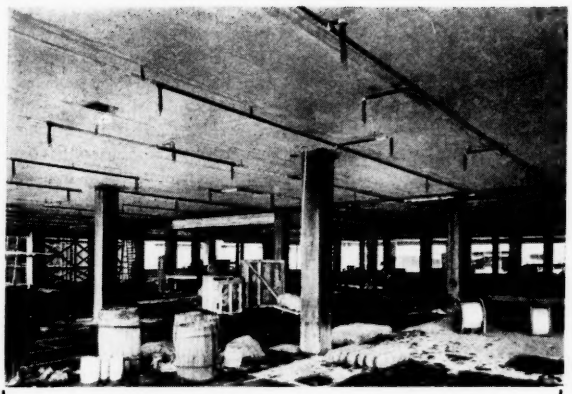
FLUORESCENT LAMP—
Bulletin No. 5-22—"The 100-Watt Cooper Hewitt Fluorescent Lamp," discussing characteristics of this new lamp for general industrial lighting, and presenting detailed description of its outstanding features.
General Electric Vapor Lamp Company, 410 Eighth Street, Hoboken, N. J.

DETROIT STOKERS—
Bulletin No. 350—devoted to the Detroit LoStoker, a complete mechanical firing unit for burning various grades of bituminous coal with high efficiency;
Bulletin No. 545—"Economical Steam Generation in the South," illustrating many prominent Detroit Stoker installations in Southern states.
Detroit Stoker Company, General Motors Building, Detroit, Mich.

JACKSON EYESHIELDS—
Folder—illustrating and describing the Jackson Eyeshield for eye protection in industry, sports, etc., including soldering, disc grinding, welding, fishing, golfing, skiing, etc.
Jackson Electrode Holder Company, Detroit, Mich.

ALUMINUM PAINT—
Booklet—"15 Years Behind the Brush," a publication on aluminum paint for wood priming.
Aluminum Company of America, Pittsburgh, Pa.

CONCRETE FOR BUILDINGS AND GARAGES—
Booklet—prepared by Portland Cement Association to assist designers in planning and constructing safe and economical industrial buildings and garages; presenting details related to the structural layout of factories, such as floors, stairs, walls and roofs, installation of electric circuits, fire resistance requirements, planning additional stories and extensions, etc.
Portland Cement Association, 33 West Grand Avenue, Chicago, Ill.



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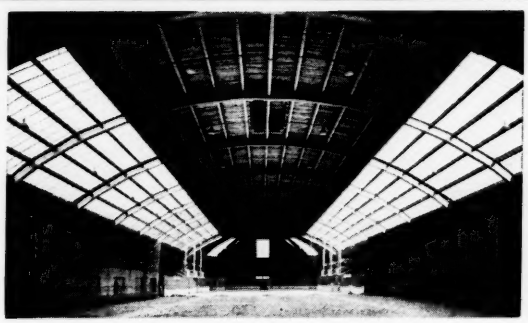
802 Met. Life Bldg., Minneapolis, Minn.



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ARMCO

ARMCO INGOT IRON

Papermaking in the South—A Brief History

(*Continued from page* 44)

directory compiled by W. A. Brewer. Of these, Maryland had 38, Virginia 12, North Carolina 2, South Carolina 4, Georgia 2, Tennessee 5, and Kentucky 2.

But these 65 Southern mills were reduced to 52 in 1870. The reasons for this decline, which continued for many years, were many. The era of hand production was forced to give way to mechanical means and in addition, ways had now been found satisfactorily to utilize wood for pulp. This resulted necessarily in the elimination of many mills because on the one hand the old mills could not compete with the new ones in quantity, while on the other hand the cost of the new methods and equipment was such as to be beyond the grasp of all except a few. Furthermore, the movement toward concentrated capital began to make itself felt during the closing years of the century resulting in an ever-widening circle of absorptions and combines such as the world had never known.

Returning to 1870, we find that the 52 Southern mills comprised 26 in Maryland, 5 in North Carolina, 4 each in Virginia and West Virginia, 3 each in Georgia and Tennessee. Kentucky and South Carolina had two each and Alabama, District of Columbia and Missouri, one each. Distributed among these mills were 29 steam engines developing 898 horsepower and 60 water wheels capable of 2,059 horsepower. Employed in these same mills were 906 individuals with a payroll amounting to $343,600, while the annual value of products was $2,384,700 made from materials costing $1,226,500. The total capital invested was $2,680,000 or approximately one per cent of the total plant investment of the South's pulp and paper mills today.

In comparison with the amount of capital and number of mills in 1870 in relation to the annual value of products, the 46 mills operating in 1880 with a capital of $1,844,000, and annually producing $2,574,960 worth of paper offer a striking contrast and exemplify the trend of the times. These 46 paper mills, which are distinct from those solely engaged in manufacturing wood pulp, were located as follows: Maryland, 25; Georgia, 7; North Carolina, 4; Virginia and West Virginia, 3 each; Kentucky, 2; and Tennessee and District of Columbia, 1 each.

In 1890, pulp and paper manufacturing in the South reached its lowest ebb—at least in number of active mills, for in that year there were only 36 mills in operation. Of these, 30 were confined to paper alone and 24 of them, 17 in Maryland, 4 in Virginia and 3 in Georgia, had a capital investment of $1,476,069 and produced goods valued at $1,406,810 from materials costing $742,271: 753 people were employed with a payroll of $288,091. The remaining six paper mills were two in West Virginia and one each in Kentucky, Missouri and North Carolina. In addition, mills for the production of wood pulp were: West Virginia, 2; Maryland, North Carolina and Virginia, one each. Missouri also had one mill producing pulp from other sources than wood.

At the turn of the century the picture changed and the outlook became more encouraging with the development of kraft mills. The total number of paper and wood pulp mills in the South in 1900 was reported as 39, with 34 of them in three states — Maryland 21, Virginia 7, and West Virginia 6. Together these mills had a combined capital of $6,929,243 and employed 1,520 at an annual payroll of $527,796 while products to the value of $3,967,453 were made from materials costing $2,415,866. The other mills were two each in Georgia and Texas and one in South Carolina.

With this new development started, the expansion continued during the following decade until in 1910. The number of mills had risen to 41 and though Maryland, Virginia and West Virginia still led the way with 13, 9, and 9 mills respectively, other states were being represented — Georgia 5, Louisiana and North Carolina 3 each, Tennessee and Texas 2 each, and Mississippi, South Carolina and District

(*Continued on page* 56)

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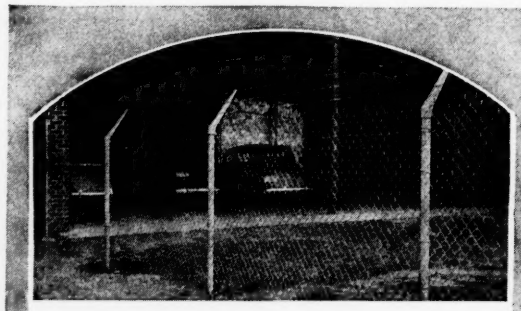

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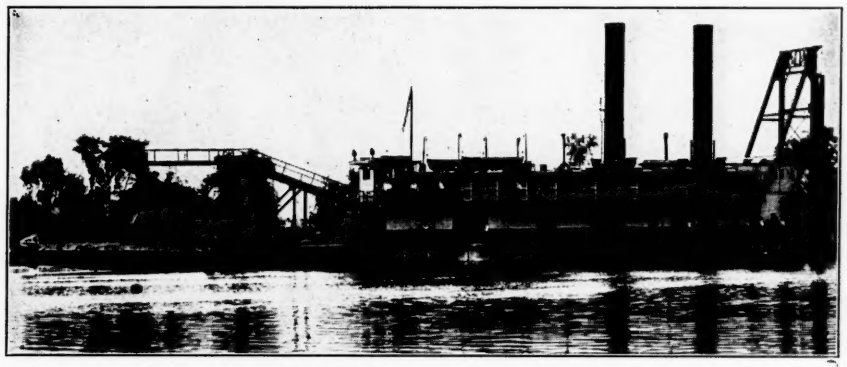

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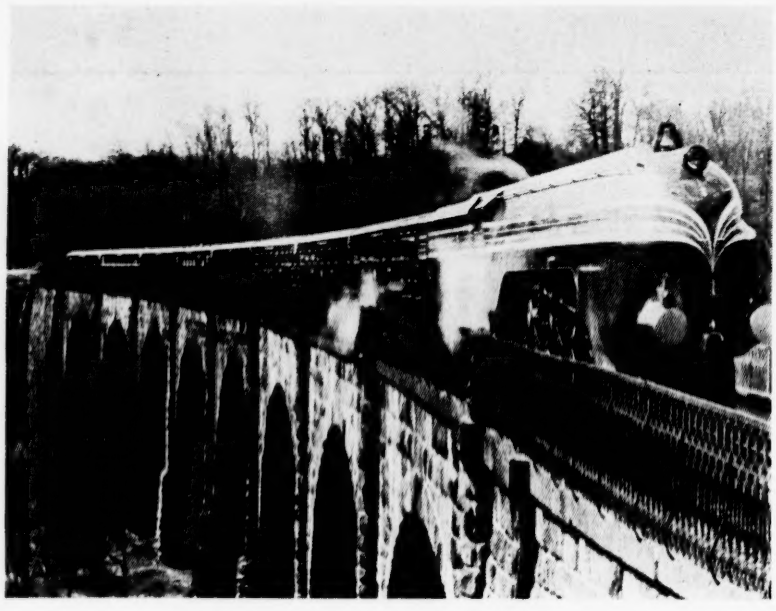

The London Midland & Scottish Railway's "Coronation Scot" passing over the B.&O. tracks on the Thomas Viaduct at Relay, Md.

British Train Visits America

Great Britain's latest streamlined train, the Coronation Scot, is now making a tour of 38 cities east of the Mississippi River prior to being placed in the railroad exhibit at the New York World's Fair. Three Southern cities — Baltimore, St. Louis, and Louisville—were included in the itinerary, which started on March 21 from Baltimore where the crack flyer of the London Midland and Scottish Railway, was landed a month before and placed in condition at the Mount Clare Shops of the Baltimore and Ohio Railroad.

The initial trip on American soil was over this road's lines between Baltimore, Washington and several points to the west, as members of the press and newsreel cameramen turned out 250 strong to view the British train in action, compare its size with modern steam, diesel and electric locomotives of this country and watch it in a pseudo race with the Baltimore and Ohio's big bullet nose Royal Blue locomotive drawing seven cars. During regular service in its native habitat, the English train averages 61.7 miles per hour, although attendants point proudly to a speed of over 100 miles an hour.

Width and height clearances in the British Isles are lower than those in this country, a fact wich accounts for the cars and engine of the Coronation Scot being somewhat smaller than those of standard American units.

Two first class coaches are part of the train. Each has twelve compartments with four seats opening off the lengthwise corridor. Broad windows with upper horizontal panels that can be opened by the traveler admits natural light from both sides. Sliding doors between compartment and corridor have large glass panels which may be closed and curtained to allow the privacy found lacking in this country by the English.

Papermaking in the South—A Brief History

(Continued from page 54)

of Columbia, 1 each. The capital investment of 31 mills in the three leading states rose to $17,270,000 with a yearly output valued at $11,203,000 from materials costing $7,109,000. The payroll of $1,529,000 provided employment for 3,323 persons.

By 1920 the number of mills had risen to 47 with 10 each in Maryland and Virginia and 9 in West Virginia. These three states' mills now employed 4,315 people at an annual salary of $4,902,000 and produced $28,407,000 worth of goods with materials aggregating $17,912,000, a gain of more than $17,000,000 annually since 1910. Great as this increase was, however, it is dwarfed by the 57 paper, wood and other pulp mills existing in 1930. Together these mills had an annual production of $80,352,483 embodying materials, exclusive of purchased electric energy, valued at $46,072,588. The payroll covering 7,235 employees was $9,010,209. Included among the 57 mills were: Louisiana, 11; Virginia, 10; Maryland, Tennessee and West Virginia, 6 each; North Carolina, 5; Alabama, Georgia, Missouri, South Carolina and Texas, 2 each; and Arkansas, District of Columbia and Mississippi, 1 each.

The South looks forward to the future with anticipation.

"STEEL HORIZONS"—
Under the foregoing caption, the Allegheny Ludlum Steel Corporation of Pittsburgh, Pa., has issued the first edition of a new house publication which it plans to issue six times yearly. Attractively illustrated, the new magazine is intended to keep its readers informed of the "ever-widening scope of marching steels" and to indicate the progress and service offered by "The Steels of Today and Tomorrow."

Advice From an Expert

Courtesy New York Herald Tribune © 1939

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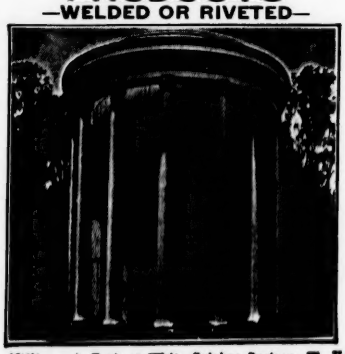
—WELDED OR RIVETED—



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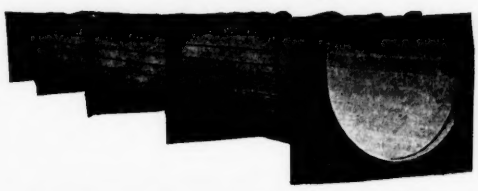

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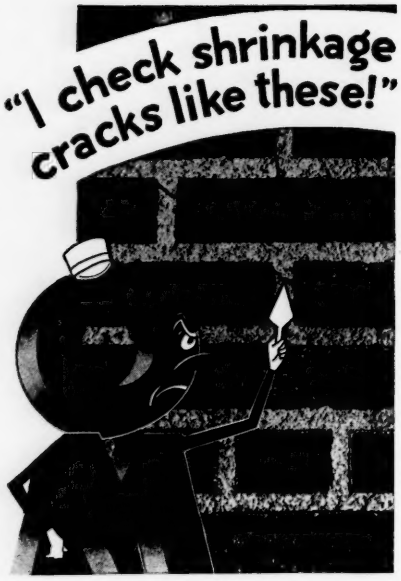

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MASTER BUILDERS

Processes Used in the Southern Pulp and Paper Industry

(*Continued from page* 37)

pulps, that is, the fibres are so short that they lie in between the long fibres when making a sheet of paper. Some of the older mills such as those located at Canton, N. C., Kingsport, Tenn., and Bristol, Tenn., have made soda pulps for many years. None of the new mills erected in the past few years are operating this soda process.

The sulphate process is an offshoot of the soda process. Sodium sulphate is reduced to sodium sulphide by the carbonization of the organic constituents of the liquor. A step called causticization, which consists of treating the carbonate content of these liquors with lime, is required to produce the pulping solution of caustic soda and sodium sulphide. The use of this so-called sulphate process has increased tremendously in the South.

Southern pine is the chief wood used in the Southern pulping industry. As we all know, it contains relatively large amounts of resinous material. Such rosins are soluble in alkaline solutions, while in an acid solution, such as is used in the sulphite process, they are rather inert. We therefore have the answer as to why the sulphate process is used so predominantly in the South. Pine can be pulped by the sulphite process, but it is much more difficult and troublesome.

The names kraft and sulphate apply to the same pulping process. Kraft, however, is usually used to designate the process when used in the manufacture of brown or unbleached pulps. The term sulphate usually applies when bleached or white pulps are being produced. In detail these two processes are not strictly the same, but in general there is little difference.

In the production of chemical pulps, the logs are fed into large hoppers where the wood comes in contact with a rotating disc on the surface of which are fastened steel knives. The logs emerge as chips which are screened and then fed into digesters. A digester is a large steel container, usually stationary and vertical, about 40 to 45 feet tall and 8 to 10 feet in diameter. The chips and cooking chemical are loaded first. Then, in the sulphate process, the solution is heated by steam to about 340° F. and 110 lbs. pressure. After three to five hours, depending on the type of pulp to be produced, the large blow off valve is opened and the contents are blown into a tank by means of the steam pressure in the digester itself. The pulp is then separated from the cooking liquor, all traces of which are removed by washing. Following this the pulp is screened to remove knots and unliberated fibres. Unless bleached pulp is desired, the pulp is then ready for the paper machine operation. The cooking liquors are evaporated and incinerated to burn off the soluble organic constituents coming from the wood. Meanwhile the cooking chemicals are ready to be treated with lime and used in another cooking cycle.

Those of us who knew Dr. Charles Herty were indeed privileged. His smiling, congenial manner and his contagious enthusiasm were an example for us all. Dr. Herty did a great thing for the South when he popularized the possibilities for pulp and paper manufacture.

For over thirty years there have been quite a number of pulp and paper mills manufacturing paper board and brown wrapping papers. These so-called kraft pulp products account for almost 50 per cent of the entire paper consumption in the United States. The Southern Kraft Corporation with its many mills distributed through the South is an excellent example of this type of operation. Here, the pulp is made in large quantities and is converted into one or two products which are made continuously day after day. The brown paper bag and the brown wrapping paper used by every grocery-man, as well as the paper boxes or cartons which are used so extensively, are all products in which the kraft pulp from the South plays a major role.

The pulp industry in the South might well be divided into four distinct divisions. First is the paperboard industry, the chief products of which are containers and brown wrapping paper. It is this division which uses kraft pulp and which has been the leading consumer of southern pine for a number of years. With the exception of possibly three or four mills in the South, all the pulp activity is in the manufacture of these products. The newsprint industry is the second division and will start with the first mill in Lufkin, Texas, next year. The third division is the rayon pulp industry, which, as has been mentioned before, is being projected at Fernandino, Florida. Fourth, and probably one of the most fascinating parts of the industry is the manufacture of bleached white paper. White papers from southern pine have been made in the South since 1919, and possibly earlier. Early expansion of this branch of the industry was delayed because of difficulties in bleaching the southern pine pulps to a good quality white pulp. In recent years this difficulty has been overcome and now several mills in the South are manufacturing such products.

Expansion of the pulp industry and its establishment as a permanent institution in the South depend upon many factors. Although southern pine is prolific and grows rapidly, there is as yet no conclusive evidence that it will produce more than the requirements of the mills already established. Future mills will have

(*Continued on page* 59)

Processes Used in the Southern Pulp and Paper Industry

(*Continued from page* 58)

to consider seriously the adequacy of a sustained source of raw material. The present processes, which have been in actual use for over 30 years in the South, present no major technical problems under present conditions. However, the industry has already experienced an increased demand for quality. Increased competition will mean that the northern, western and Scandinavian mills will make further improvements in the quality of their pulp and paper. Can the southern mills meet this demand for increased quality? Is the southern pine an adequate raw material to meet it? Upon these points and upon other conditions such as the sustained renewal of the pine tree crop depends the answer to the question whether the South can look for expansion and stabilization of its pulp and paper industry.

Pulping of Southern Hardwoods at the Herty Laboratory

(*Continued from page* 36)

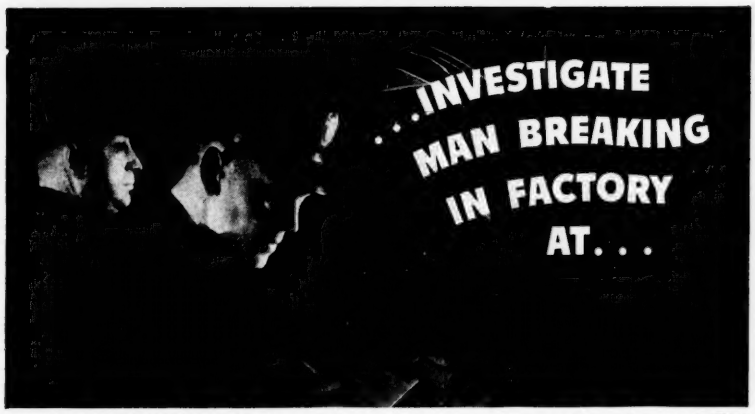
fiber alleviates in part these shortcomings, and certain changes in equipment promise further betterment. Reactivity, or the completeness to which the fibers react and dissolve in the viscose solution, is good. An unexpected characteristic of the hardwoods is the marked haziness of the viscose solutions. The cause of the haze is the presence of less than 1 per cent of a wax-like material. The wax is extremely resistant to saponification and persists after recooking with caustic.

Mechanical Pulping

Black Gum and Cottonwood: As mechanical pulps are not readily bleached, natural color is an important characteristic of such. Freshly-cut swamp black gum and cottonwood give groundwoods of very good color, often 60 to 65 brightness. The tupelo gum pulp is darker, due undoubtedly to the prevalence of heartwood in that species. The red gum pulp is of very poor color, attributable to the high tannin content of this wood. Other Southern hardwoods are less significant because of either inferior colored pulps or limited supply.

Black gum and cottonwood mechanical pulps are weaker than similar coniferous pulps. As groundwoods are seldom if ever used alone, a possibility exists of disregarding strength in these pulps and working towards very low power consumption while maintaining such characteristics as opacity, fineness and softness. By means of sharp grinding surfaces and high pressure, black gum groundwoods can be made with as little expenditure of power as 500-KWH per ton. When such pulps

(*Continued on page* 60)



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UNITED STATES STEEL

Pulping of Southern Hardwoods at the Herty Laboratory

(*Continued from page* 59)

are made on a fine grit stone they can be used in book, magazine and news grades where the deficiency in groundwood strength is compensated by the use of increased amounts of chemical pulp. These low-power stocks are surprisingly free of shives, and impart to the sheets in which they are used the desired opacity, softness and printing characteristics.

Summary and Future Possibilities

Semi-bleached and full-bleached gum sulphate pulps have those papermaking qualities which suit them for many papers and boards where imported unbleached and bleached sulphites are now used. These grades are bonds, books, board liners and specialties in which formation, finish and opacity are important characteristics.

Black gum, red gum and cottonwood can be converted by the sulphite process into wood celluloses that can be employed for viscose. Certain characteristics, however, apparently limit its possible use to less exacting staple fibers.

The light-colored groundwoods from swamp black gum and cottonwood have promise for book grades, manilas, boardliners and newsprint. It is possible that such groundwoods produced with as little as 500-KWH per ton will find a place where their color, opacity and printing characteristics will offset their lack of strength.

[2]"Preliminary Report of Investigations Concerning Use of Swamp Black Gum Sulphate Pulps for High Grade Papers"—Carpenter and Ritter. Technical Association, Pulp and Paper Industry, Fall Meeting February 1939, New York City.

The Forest as a Source of Man's Needs

(*Continued from page* 32)

the burning of wood and coal—both products of the forest. Man is not yet independent of the forests for shelter.

Clothes from Trees

Man for many thousands of years depended upon fibers of various plants to make clothing for himself. Flax and cotton furnished him with his most useful fibers which he has learned to spin and weave upon machines gauged to handle fibers of such length and quality as cotton and flax produced. In modern days the chemist has discovered that these two fibers are not fundamentally different from those of other vegetable or plant life. Indeed, chemically they are identical, and such slight physical differences as length and strength are minor details when they are thrust into the test tube of the chemist. From this test tube they are dissolved and respun into lengths most suitable for his purposes. When cellulose, the common material of all these fibers—that material which has been built up in the growing tree of the forest, has passed through the test tubes and retorts of the laboratory it comes out in fibers not one inch but a thousand miles long if so desired. Why bend our backs and wear out our lives in an attempt to grow cotton or flax fibers while nature is growing the same substance in our forests for one-tenth the cost? Thus the growing forests assume a new role in furnishing clothing and if man desires more and better clothing, there is no reason why he should not have it in quantities undreamed of by simply using the ingenuity of the test tube in modifying the fibers of wood.

It will be seen from the above that the forests of the world are destined to play an important role in clothing as well as sheltering man; that chemically speaking the fiber of the tree and the lint of the cotton are identical chemical substances with minor physical differences, and clothing from wood is so rapidly displacing clothing from cotton that plant breeders are now producing a cotton void of lint and more prolific in seed from which we obtain food.

(*Continued on page* 62)

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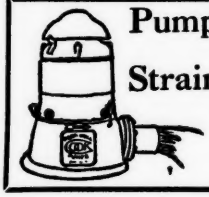

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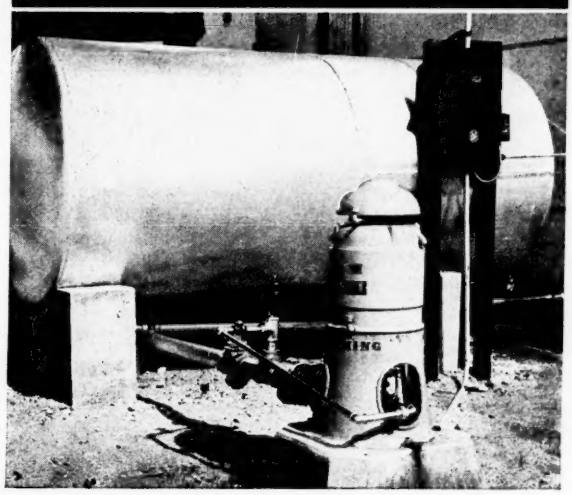

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The Forest as a Source of Man's Needs

(*Continued from page 60*)

Food from Trees

A still more unbelievable picture comes to the chemist when he discovers that the composition of cellulose (wood) and starch are identical. There is a slight difference in the complexity of the molecule, but to the chemist this is no real obstacle for he knows his molecules as the architect knows his blueprints and can change them as easily. It has been discovered that cellulose can be changed into starch and sugar by treatment with acid which is easily neutralized. We reach the astonishing conclusion that the transformation of wood to food is a simple change and bread from the forest seems a reality of the near future.

Our Dependence on Cellulose

The search of the chemist today is largely concerned with cellulose—the product of the forest. We live in a cellulose age. Our shelter, clothing, and food may be realized from this substance. Our forests furnish man with this material. They also furnish energy for our civilization. On these the life blood of the nation depends. Nature's most important chemical laboratories at the present time are in the forests of the world. If we only knew what makes grass green—knew the hidden secret of chlorophyl—that green substance within the leaves. When man is able to pass carbon dioxide and water through a tube of chemically prepared chlorophyl and with the aid of the sunlight make cellulose we might be independent of the forest. Until this is known we must depend upon photo-synthesis for food, shelter, and clothing. Our forests are our most economical photo-synthetic chemical laboratories. It is our duty to protect them and save them from further destruction. Destroy a forest and create a dust bowl or desert. Save a forest and let great chemical industries thrive upon its products.

This chemical laboratory of the growing tree is a sort of self sustained unit and is one of nature's wonders. It takes much of the waste products of life and industry, such as carbon dioxide and water, and compounds them with the energy of the sun to make wood upon which industry thrives. It does more than this; it heals its own wounds, for nature provides certain substances contained within the sap of the tree which serve as an antiseptic healing drug to protect such scars as may be inflicted on the body of the tree. When a pine tree is scarred, immediately a liquid exudes on the wounded spot, becomes sticky, and then solid through action of the atmosphere. A deposit of rosin is carefully and accurately placed over the scar. Man has found many uses for this rosin. He even skins the tree in order to make it pour forth this life saving balm. No sooner has it appeared on the surface than he scrapes it off and carries it away for a thousand uses. Our naval stores industries are built on this significant fact. Millions of dollars worth of such raw materials as turpentine, rosin and pitch are exported only to be shipped back to us as more valuable products such as varnishes, solvents, camphor, and many other valuable drugs.

In conclusion, it will be seen that the forests of the world constitute our most wonderful chemical laboratories. Through photo-synthesis, carbon dioxide and water, the results of decay and industry, are compounded with the energy of the sun, furnishing man with power, shelter, food, and clothing. Save our forests. Grow more trees, and upon cellulose let us build our way back to prosperity.

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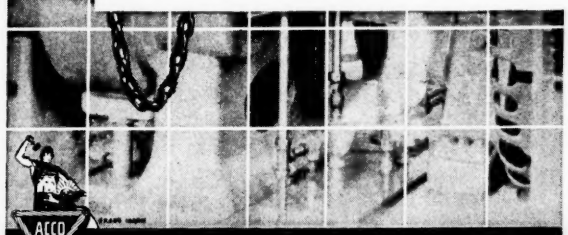

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Wood, An Important Cellulose Crop

(*Continued from page 46*)

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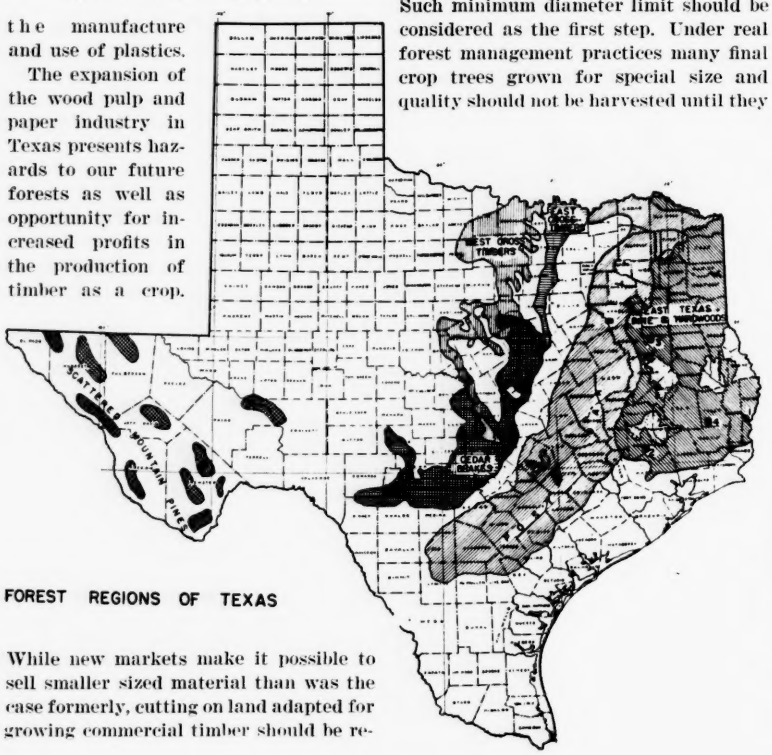

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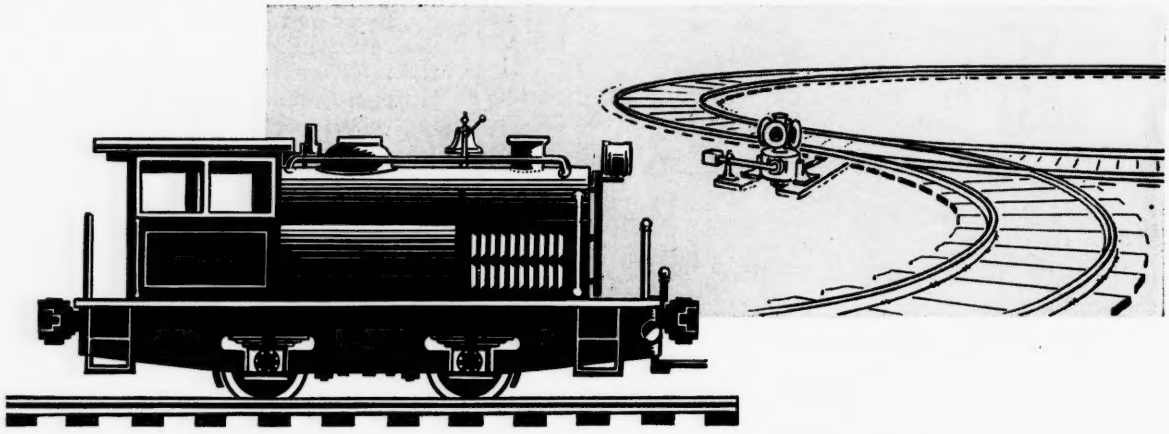

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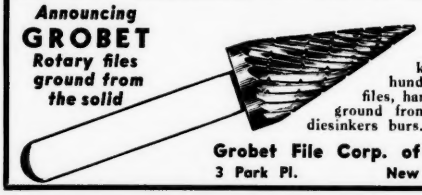

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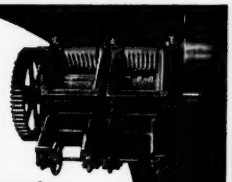

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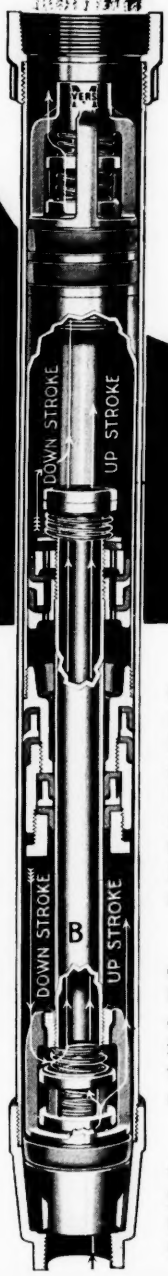

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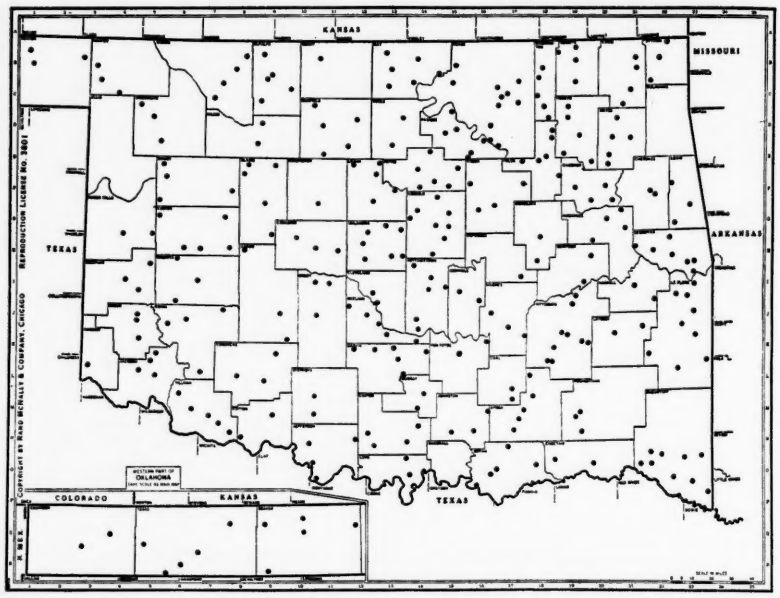
Railway Expenditures in Oklahoma Exceed $31,000,000

(*Continued from page* 33)

schools. On this basis, the school taxes paid by the railroads in Oklahoma amount to around $2,064,000 a year — sufficient to defray the annual cost of educating approximately 43,000 Oklahoma children. In addition to school taxes, the railroads paid out an average of $1,936,000 annually in other taxes in Oklahoma, taxes which went to build and maintain public highways and to defray the general costs of government.

Railway employment extends into every one of Oklahoma's 77 counties, and in such railway centers as Oklahoma City, Tulsa, Muskogee, Shawnee, El Reno, Clinton, Enid, Durant and Chickasha, the railway payroll is one of the barometers of local business activity. In July, 1937, the last month for which a geographical census of railway employees was taken, 12,220 persons were employed on the railroads of Oklahoma. These workers, with their families, comprise a group of around 60,000 persons who are dependent upon railway employment for their livelihood.

The railway payroll in Oklahoma in 1937, a year of subnormal railway activity, amounted to $1,000,000 every three weeks. This large inflow of money, which totaled $17,008,000 in 1937, is spent throughout the state, for there are very few towns of importance in the state, in which railway workers are not employed.

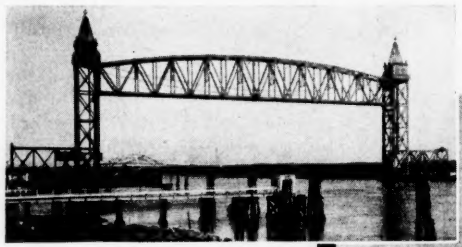


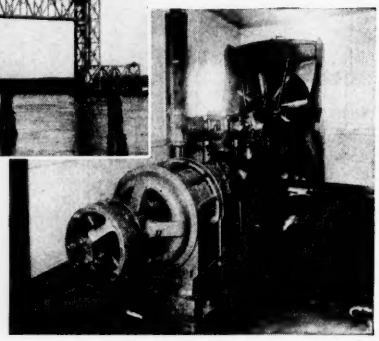
Railway purchases of materials and supplies are distributed among 293 cities in 74 of Oklahoma's 77 counties

Thus, as agencies of transportation, as taxpayers, as employers of labor, and as purchasers of the state's products, the railroads stand in the front rank among the constructive economic forces of Oklahoma.

THE GOLDEN GATE BRIDGE—SAN FRANCISCO
TRIBOROUGH BRIDGE—NEW YORK
WELLAND CANAL BRIDGES—20—CANADA

The Pennsylvania Railroad Bridges, C.R.R. of N.J. Bridge, the D.L. & W.R.R. Bridges at Newark, the New York State Bridges at Albany, most all of the prominent bridges in the past 20 years have Sterling Engines, either for primary power or emergency.





Cape Cod Canal Bridge at Buzzards Bay, Massachusetts, project of U. S. Engineers, is equipped with 125 K.W. 1200 R.P.M. generator, driven by Sterling Dolphin C 8-cylinder gasoline engine.

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